the OIL AND GAS JOURNAL

SYMBOL OF SERVICE

Wherever there's rotary drilling, there's a Hughes representative ready and anxious to be of service to you. His recommendations reflect the Hughes Tool Company "know-how" gained through years of laboratory research and field experience. Anywhere in the U. S. his record of reliable rig delivery assures the right rock bit on your rig at the right time.

Reliable Service is another example of the Hughes determination to provide an "Engineered Solution" for your every drilling problem.

HUGHES
TOOL COMPANY
HOUSTON, TEXAS
® WORLD STANDARD OF THE INDUSTRY

PRICE 50 CENTS TABLE OF CONTENTS PAGE 33 SEPTEMBER 8, 1949

It takes

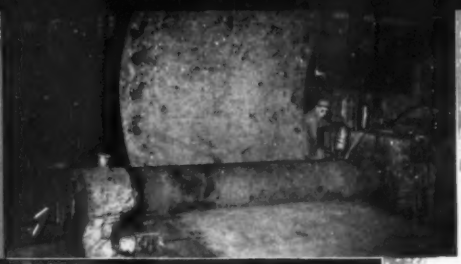
Steel and Skill

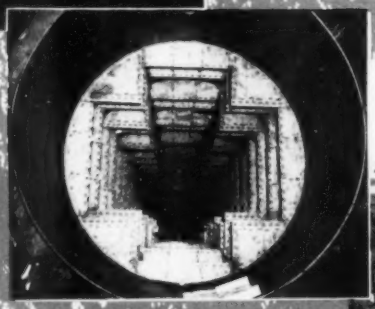
to make a "tailored" tower

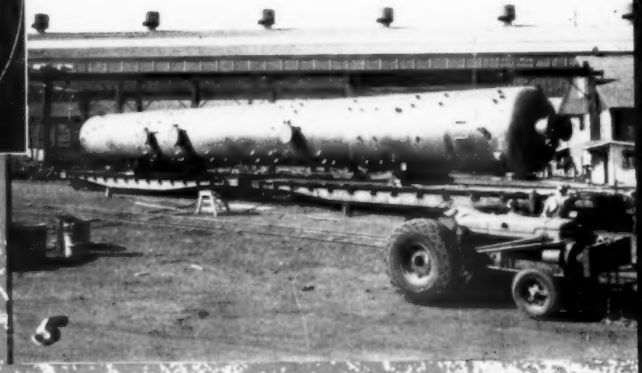
. . . and good "tailors" are intimately acquainted with this combination. For at every step—preparing detail drawings, ordering plates to size, shearing and beveling the edges of the plates, and rolling plates to exact radii—the "tailor" must know the material and exercise skillful craftsmanship to produce—at reasonable cost—a tower that does the job.

The accompanying views demonstrate that CB&I is well equipped to fabricate specialized refinery equipment. To assist the men and equipment shown, we have special facilities for x-raying and stress-relieving pressure vessels. Certainly, welded steel plate structures produced by CB&I are "tailor-made" to meet your individual requirements.

In addition to towers and pressure vessels, CB&I builds many structures for the petroleum industry—including those familiar trademarks of high pressure storage, the Horton-sphere and Hortonspheroid. The next time you need steel plate work, write our nearest office for a quotation "tailored" to your requirements.







(1) The plate is being rolled into shape.

(2) Rolling completed with welding the next step.

(3) The inside seam of the ring is welded. (A stainless steel lining was also welded to the inside of the lower portion of the tower).

(4) Trays are installed in the tower.

(5) All finished and ready to go!

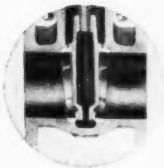
CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1519 Lafayette Bldg.
Houston, 2.....402 Abreu Bldg.
Los Angeles, 14.....3142 National Standard Bldg.
New York, 6.....1528 General Petroleum Bldg.
Philadelphia, 3.....1613—1700 Walnut Street Bldg.
Salt Lake City, 1.....1525 First Security Bank Bldg.
San Francisco, 4.....22 Battery Street Bldg.
Seattle, 3.....1725 Henry Bldg.
Tulsa, 3.....1404 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 2348, Caracas, Venezuela
Compagnia Tecnica Industrie Petroli, S.A.I., Rome, Italy
Cleveco, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland



Straight-Flow Port Design reduces fluid turbulence to a practical minimum.

Seat Rings of end-seated type are screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.

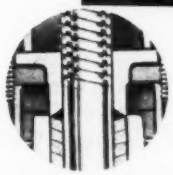
WALWORTH

iron body gate valves

with screwed or flanged ends

... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.



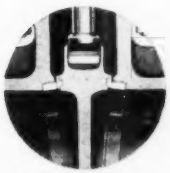
Brass Liner on Glands assures greater resistance to corrosion and scoring.

WALWORTH

valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

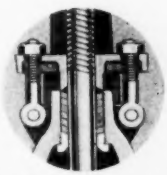
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

Bronze Back-Seat Bushings in bonnets of OS&Y valves.

Solid Web Type Disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1949

Designed for the job!

the ZC engine

The Fairbanks-Morse ZC Engine is designed specially for oil well pumping . . . not an adaptation of a conventional type engine. Fast, easy starting in any weather . . . trouble-free vapor cooling . . . extra-heavy flywheels for smooth, fuel-saving operation . . . minimum maintenance and attention are built-in features that have made the ZC *the oil field favorite.* Your supply store will be glad to give you the complete story. Fairbanks, Morse & Co., Chicago 5, Ill.

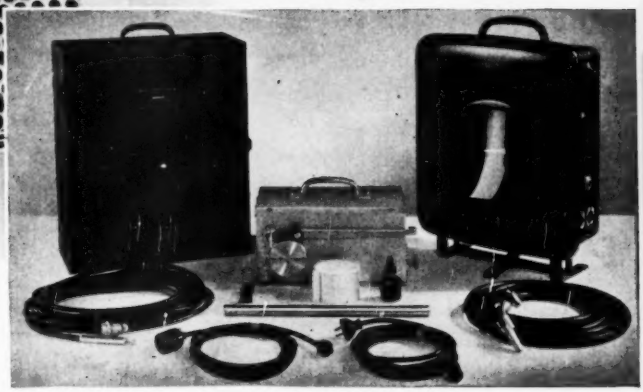
When it comes to engines . . .

FAIRBANKS-MORSE

A name worth remembering

OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

Now! Faster PROBOLOG checks heat exchanger tubes



New simple probe insertion with compressed air makes the use of Probolog a one man job . . . greatly speeds up tube checks.

Improved– HIGHER PROBE SPEED

Improved– MULTI-PURPOSE PROBES

Improved– SIMPLE, PRECISE CONTROL SETTINGS

Probolog is the much-discussed electronic instrument which makes visible, permanent records of the condition of individual, non-magnetic tubes in heat exchangers and other tubular equipment.

After several years of commercial service, Probolog has earned a unique record of reduced maintenance costs, of unfailing accuracy and safety in the inspection of tubular equipment.

Shell has now added several improvements to the original Probolog, making it even more precise, more versatile and easier to use.

A new booklet contains a comprehensive description of Probolog and its operation. Please use the coupon. Demonstration can be arranged.

Shell Development Company, Incorporated
50 West 50th Street, New York 20, New York

Please send me a copy of "The Probolog."

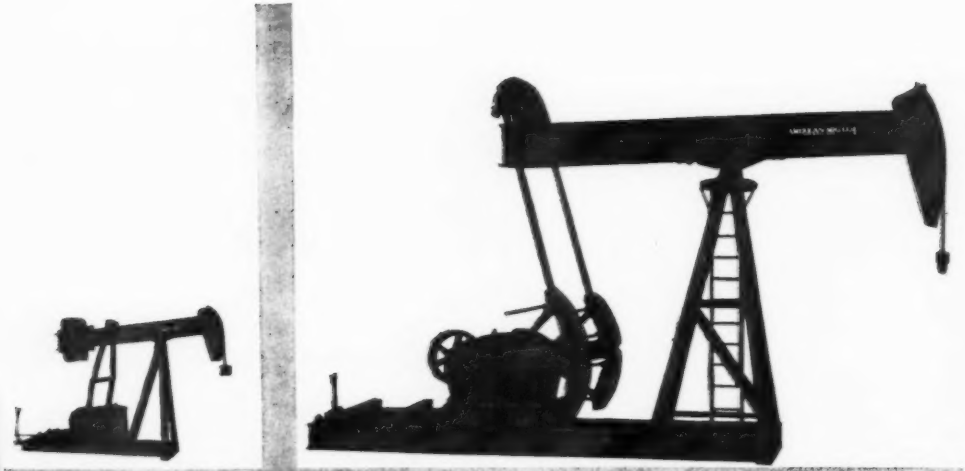
Name_____ Title_____

Company_____

Address_____

City_____ State_____

SHELL



from the husky little T-5 ... *to the big powerful T-27*

AMERICAN Units

... reduce pumping costs

Whether the job is large, small, or in-between, there is an American Pumping Unit the right size to give longer service with less servicing. Various combinations of structures and reducers make available a wide range of Units from which the most economical application can be selected.

American Units are designed to A.P.I. standards. Specify American ... proven by 25 years of service to the oil industry.

Contact your favorite supply store or the nearest American office NOW

25th Year

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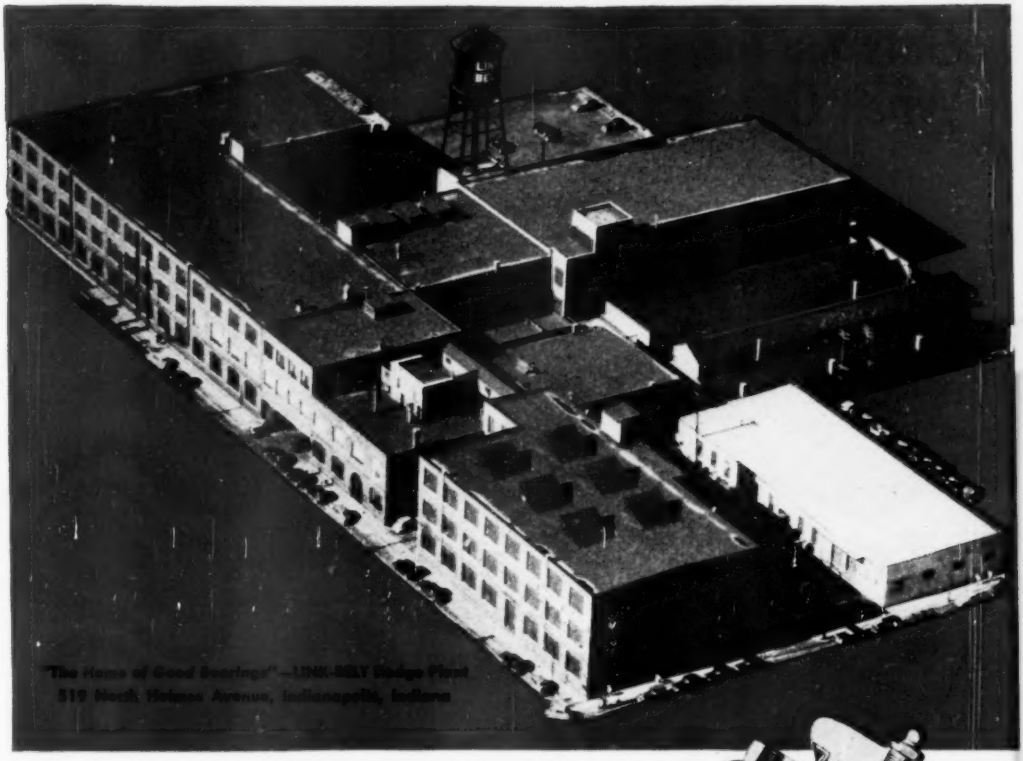
AMERICAN MANUFACTURING COMPANY OF TEXAS

FORT WORTH, TEXAS PHONE 8-2301

One LINK-BELT Plant devoted *Solely* to bringing you better bearings—*Quickly*



"The Home of Good Bearings"—LINK-BELT Dodge Plant
519 North Holmes Avenue, Indianapolis, Indiana

Meeting industry's ever-increasing demands for ball and roller bearings that offer the desired combination of free-rolling action, self-alignment, and long life is no small-sized job.

That's why the entire capacity of Link-Belt's Dodge Plant in Indianapolis is devoted to this important task.

From the receipt of housing castings furnished by sister plant foundries to shipment of finished mounted bearings, alert design engineers, skilled craftsmen and the most modern bearing production machinery work hand-in-hand to turn out the bearings that enable users to TURN SHAFTS EFFICIENTLY.

Cut-away view of Series 200 Ball Bearing Pillow Block

LINK-BELT COMPANY

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Distributors in Principal Cities

11,387

LINK-BELT

Ball and Roller BEARINGS

Now...A Car Built for Oil Country

Gets You There When Others Can't!

The New
4-Wheel-Drive

Jeep
PRODUCT
WILLYS-OVERLAND

WILLYS
Station Wagon

Here's the kind of a car oil men have always needed—a full-size car, with an all-steel body, that travels the roughest oil country and takes you through places too tough for ordinary cars!

The rugged 4-wheel-drive of this new Willys Station Wagon gives you all-wheel traction, ability to get through to hard-to-reach locations, even when mud, snow and ice takes over the country.

This car is built on a newly engineered 4-wheel-drive chassis with a sturdy steel girder frame, 104" wheelbase. It's roomy and comfortable, with seats for six . . . plus space in the rear for a big load of tools and equipment. It is highly maneuverable, has ample road clearance and flat, open, dent-resisting fenders.

See this great oil country car now at your Willys-Overland dealers.

YEAR 'ROUND TRANSPORTATION over deep-rutted lease roads or through roadless areas is assured with the 4-Wheel-Drive Willys Station Wagon. You shift to conventional 2-wheel-drive for level ground and hard roads.

HAULING CAPACITY can be easily increased to 98 cu. ft. of load space by removing rear seats. With the end gate down you have a flat bed 8½ feet long. Seats and interior are washable!

WILLYS-OVERLAND MOTORS, TOLEDO 1, OHIO • MAKERS OF AMERICA'S MOST USEFUL VEHICLES

For HIGHER Production

in corrosive wells...

install a

PELTON

LONG-STROKE HYDRAULIC PUMPING JACK
with "MONEL" Polished Rods

Logged records prove it! The Pelton jack with MONEL* polished rods keeps production *up*—and downtime *down.*

But that's not all!

Pelton's 20-foot constant velocity stroke with fewer and softer controlled rod reversals leads to longer life for sucker rods and bottom hole equipment.

Monel polished rods are supplied for severe service with Pelton jack models that cover a range of polished rod load ratings from 20-40,000 pounds.

Because of their high tensile strength and exceptional toughness, Monel polished rods can be used — with ample safety margin — in any depth well. They never rust. They're highly resistant to wear and abrasion. They stand up under the corrosive action of brines, crudes and hydrogen sulfide.

What's more, Monel polished rods hold their original hard, smooth surfaces. They don't pit, don't tear packing.

In short, the use of Monel polished rods in the Pelton jack insures extended equipment life. And at the same time, you're pumping *more* oil at *lower* cost!

Reg. U. S. Pat. Off.

PORTABILITY PLUS PERFORMANCE. Mounted on a single portable skid, this Pelton Series A-P jack has a 20-foot constant velocity stroke and full hydraulic reversal control. A multiple-valve port permits instant stroke variation without stopping the jack. Bottom hole pump spacing, too, can be changed during operation.

In addition to other advantages (all fully covered in Bulletin No. 38, available on request), the long slow stroke of the Pelton jack is said to increase volumetric efficiency of the bottom hole pump by lowering fluid velocities through the standing valve. At the same time it reduces tendency to gas-lock.

Designed and equipped for long, trouble-free performance in deep and corrosive wells, Pelton jacks are supplied with Monel polished rods with load ratings from 20,000 pounds to 40,000 pounds. *Photograph and operating data courtesy of The Pelton Water Wheel Company, Inc., San Francisco, California.*

FOR COMPLETE INFORMATION . . .

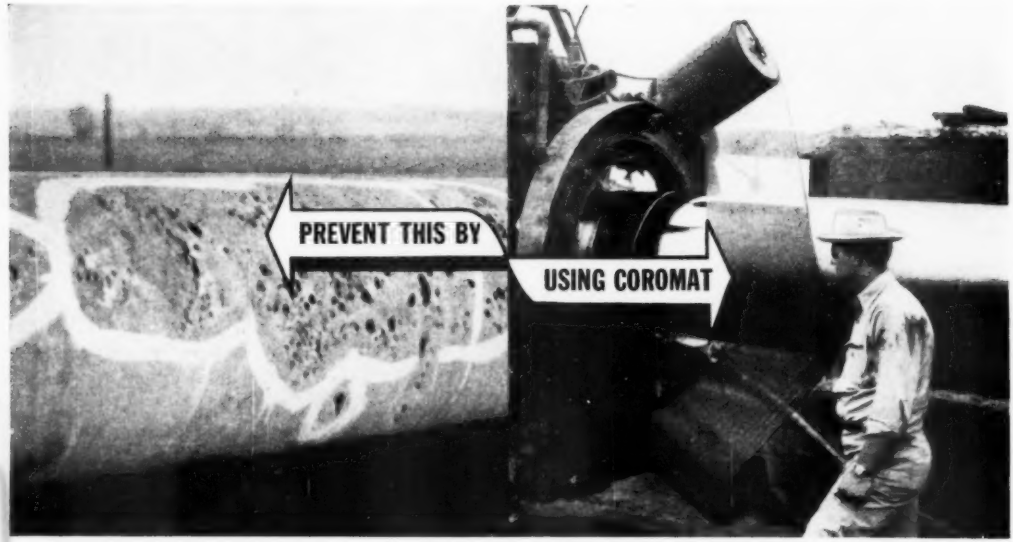
. . . about the many special features of the Pelton Long-Stroke Hydraulic Jack with Monel Polished Rods, write THE PELTON WATER WHEEL COMPANY, INC., 2929 Nineteenth Street, San Francisco 10, California. Just ask for *Bulletin No. 38.*

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE INCO

*Monel** ...YOUR PARTNER IN PROGRESS



COROMAT* *Fights Corrosion* 10 WAYS

Coromat*—the new Fiberglas* Underground Pipe Wrap, improved by the addition of extra-strong Fiberglas yarns, gives you all these advantages:

1. ***HIGH TENSILE STRENGTH:*** Coromat resists soil stress; will not crack or strip during soil temperature changes.
2. ***EXTRA IMPACT STRENGTH:*** ability of coating to resist breakage from rocks, backfills is increased 2 to 3 times by Coromat.
3. ***FEWER "HOLIDAYS":*** Coromat's high porosity allows air and moisture to escape, lets coating bleed through more evenly—eliminating a common cause of "holidays."
4. ***HIGH PICKUP:*** fineness of glass fibers gives a larger surface area for coating to cling to; permits more coating to be absorbed in a given thickness of wrap.
5. ***HEAT RESISTANT:*** withstands temperatures up to 1000°. Retains full strength under hot applications of impregnants.
6. ***MOISTURE RESISTANT:*** Coromat's glass fibers resist moisture, maintaining excellent water resistance qualities of coating.
7. ***ACID RESISTANT:*** fully resistant to organic solvents and soil acids. Helps impregnant combat electrolytic solutions.
8. ***NON-CORROSIVE:*** Coromat, being made of glass, is fully oxidized. Does not corrode or cause corrosion in contact with metals.
9. ***GREATER FIBER COUNT:*** More fibers per unit area create a closer bond, which increases protective and reinforcing qualities.
10. ***DIELECTRIC STRENGTH:*** non-hygroscopic Coromat helps maintain high natural dielectric strength of coating.

HOW COROMAT CUTS COSTS

FASTER APPLICATION: in Coromat, extra-strong glass yarns have been added to Fiberglas Underground Pipe Wrap *increasing its tear strength 400%!* This permits high-speed application without delays caused by breaks. Longer 1200 foot rolls can be used, eliminating frequent machine stops.

ECONOMICAL: costs less than 1½ cents per square foot, yet Fiberglas Coromat provides a *stronger, more lasting* reinforcement for pipe coatings.

OWENS-CORNING
FIBERGLAS

COROMAT
UNDERGROUND
PIPE WRAP

*Fiberglas and Coromat are Trade-marks of Owens-Corning Fiberglas Corporation for products made of or with glass fibers.

WRITE TODAY FOR A FREE COPY OF "CORROSION CONTROL OF UNDERGROUND PIPE LINES" AND A SAMPLE OF THE NEW, 400% STRONGER COROMAT. ADDRESS OWENS-CORNING FIBERGLAS CORP., DEPT. 957, TOLEDO 1, OHIO

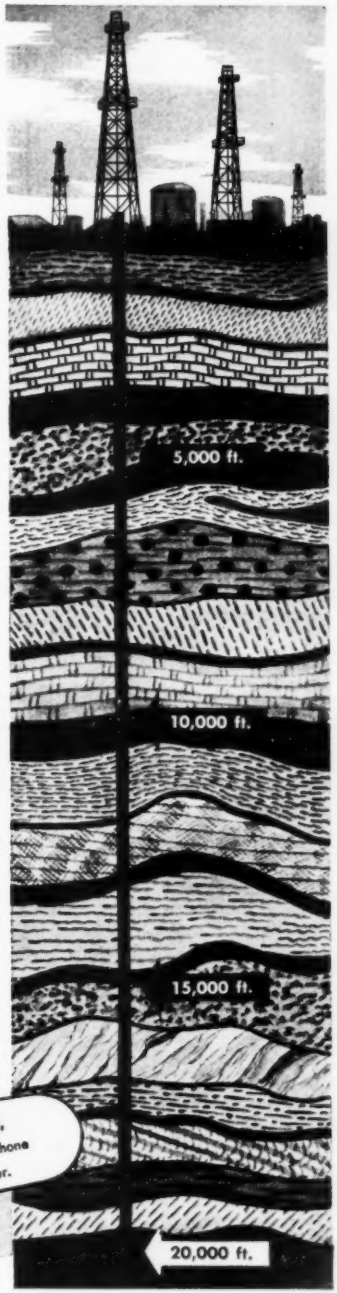
How to drill deep
without going in the hole

ROTARY hose failure can cost you plenty in down time and delay. That's why Goodyear's Style 3153-H Rotary Hose is your best answer to deep-well drilling. It was developed by the G.T.M.—Goodyear Technical Man—to handle pressures as high as 5,000 lbs. psi and depths down to 20,000 feet maximum.

From the time your spudding rig shuts down until your rotary hits pay, Style 3153-H is tailored to fit the pressures you'll be working with—and keep your drill operating at top efficiency all the way down.

Reinforced with a double layer of high-tensile steel cable, Style 3153-H is extra strong, yet flexible. It is highly resistant to crushing and kinking. And it is equipped with the time-proved Goodyear integral end, providing full flow with maximum free length.

Ask the G.T.M. about Style 3153-H Rotary Hose, and the rest of the family of Goodyear products developed to give superior service day after day throughout the oil industry. Or write Goodyear, Akron 16, Ohio.



GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GY-Specified STYLE 3153-H ROTARY HOSE for HIGH-PRESSURE DRILLING

A—Cover of extra-heavy-gauge compound resists gouging, weathering and wear

B—Extra multi-ply fabric reinforcement at ends

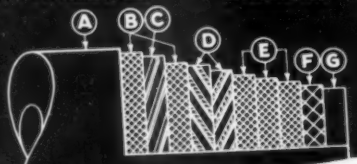
C—Spiraled copperized steel wire helices reinforce ends

D—Two gum-cushioned plies of flexible cable-steel wire

E—Multi-plies of fabric for reinforcement

F—Fabric breaker strip

G—Heavy mud-, abrasion-, and oil-resistant tube



FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

GOODYEAR

THE GREATEST NAME IN RUBBER

Safety for Oil Men . . .

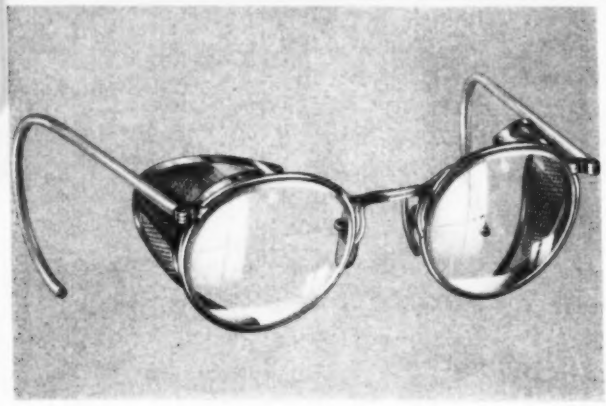
Choose AO Cup Type or Spectacle Protection

FIRST, LAST, in Front and at the Sides!

NEW AO 319 CHIPPERS' GOGGLE

Compression molded from a strong, NON-FLAMMABLE, non-swelling, PHENOLIC compound for the maximum efficiency in fit, comfort and protection, this goggle has been referred to as a "fortress over the eyes." Oil men like the DOME METAL SIDE SCREENS that give protection and provide cooler ventilation . . . the individually molded, *non*-reflecting eyecups . . . the wide view of the work. Form-fit chain bridge, large lens ring, one-piece rubber headband and style that matches this goggle's sturdiness!

REGULAR SUPER ARMORPLATE PLANO LENSES are standard—6 CURVE CLEAR OR CALOBAR LENSES, if preferred.



AO F 3149 METAL GOGGLE

Where a metal goggle is preferred, this equipment provides unsurpassed protection against flying particles striking from front or sides. One of the popular "F 3100 Series," it affords a perfect fit for workers with large features. Lenses are orbit shaped to conform to eye; frame fits close to face. Hinges and temples are out of line of sight for unobstructed vision. Large nose pads distribute weight evenly, a comfort feature. Side shields clean easily and provide ample air circulation — bridge is double braced, unusually strong. Available with 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

Your nearest AO Branch can supply you with the eye protection that meets your needs *exactly*.

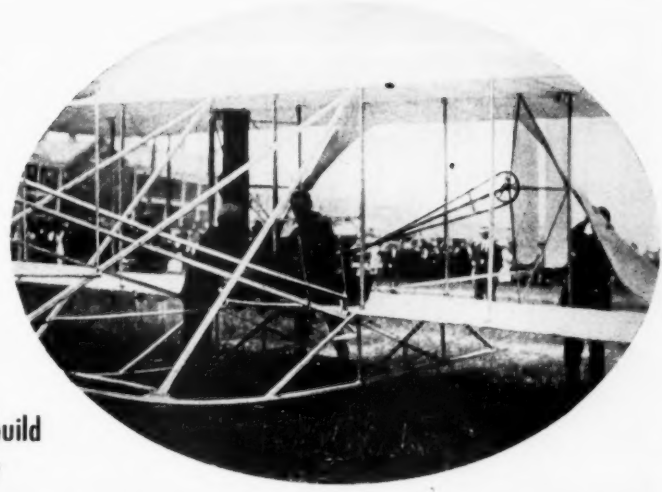
Order from your nearest AO Safety Products Representative

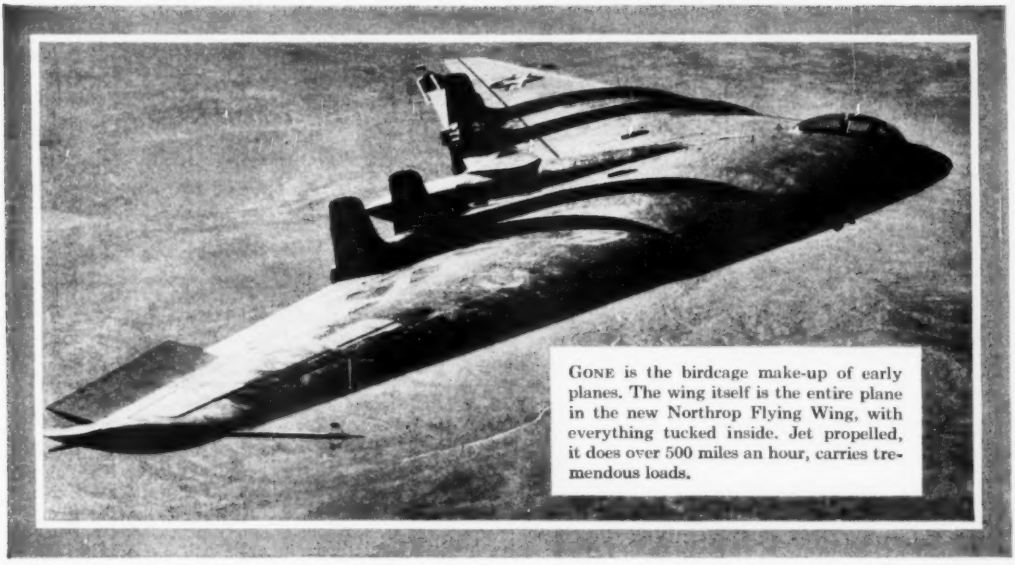
American Optical
COMPANY
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

From "Kites" to Jets!

Petroleum progress helps build the planes of tomorrow





GONE is the birdcage make-up of early planes. The wing itself is the entire plane in the new Northrop Flying Wing, with everything tucked inside. Jet propelled, it does over 500 miles an hour, carries tremendous loads.

Jato rockets boost heavily loaded planes into the air, extending range and increasing payload.

New planes, new engines, new landing gears, new controls—oil industry research must solve their complex fuel and lubrication problems, develop products to fit their needs. A leading supplier of aviation gasoline and airplane engine oils, Texaco has likewise made important contributions in the development of jet fuels, jato rocket fuel, lubricants and greases to meet the wide temperature range conditions of high-altitude flying.

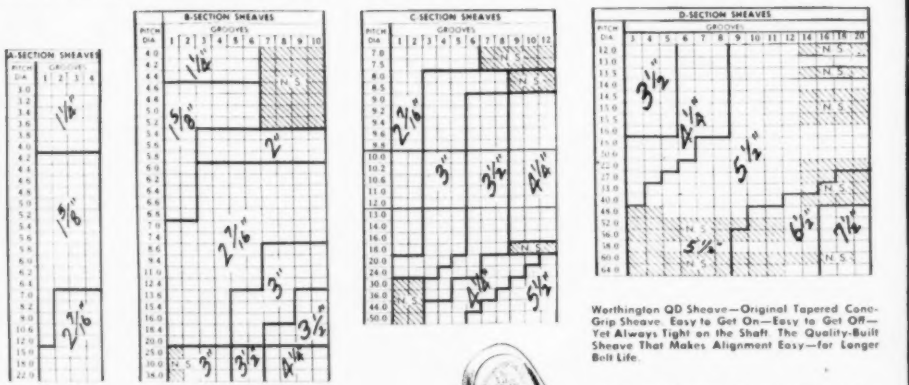
THE TEXAS COMPANY

Petroleum Promotes Progress

TEXACO REG. T.M.

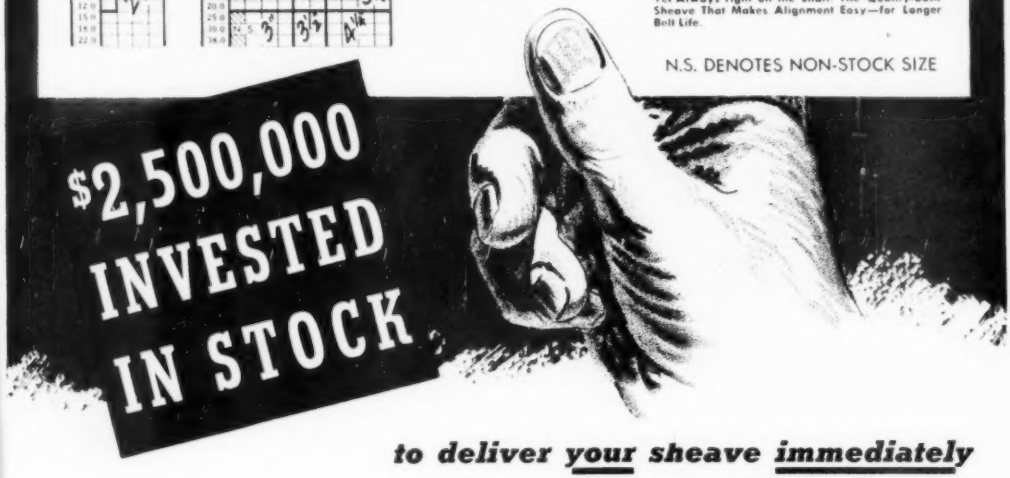
THE GOOD RIGHT HAND OF INDUSTRY

STOCK SIZES WORTHINGTON HEAVY DUTY "QD" SHEAVES WITH MAXIMUM BORES INDICATED



Worthington QD Sheave—Original Tapered Cone-Grip Sheave. Easy to Get On—Easy to Get Off—Yet Always Tight on the Shaft. The Quality-Built Sheave That Makes Alignment Easy—for Longer Belt Life.

N.S. DENOTES NON-STOCK SIZE



to deliver your sheave immediately

As long as it takes our distributor's shipment to get there is as long as it takes—in most cases—to get exactly the sheave you need into your hands. Your Worthington distributor has practically any stock size you'd ever call for—if he hasn't, one of the Worthington warehouses will get it to him in 24 hours or less.

Check your sheave requirements. With more sheaves listed as "stock sizes" and more sizes in stock than any other distributor, your Worthington distributor may be able to save you the cost of a special sheave.

Top-ranking distributors in the oil fields handle Worthington QD Sheaves and Worthington-Goodyear V-belts. They are backed by Worthington warehouses whose stocks duplicate the factory stock at Buffalo—more sizes stocked than any other sheave on the market. With 853 sizes in "A", "B", "C" and "D" section, ½ to 600 hp, you can fill almost any rpm requirement with a *stock* sheave. Also: 332 listed stock sizes of EC Cord V-belts.

So, when you need sheaves, call your local oil-field dealer.

For Balanced Drive Performance

Specify Worthington Multi-V-Drives, with QD Sheaves and Worthington-Goodyear EC Cord V-belts. (Goodyear EC Cord or Steel Cable V-belts are used exclusively in Worthington Multi-V-Drives.)

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION

MULTI-V-DRIVE SALES DIVISION

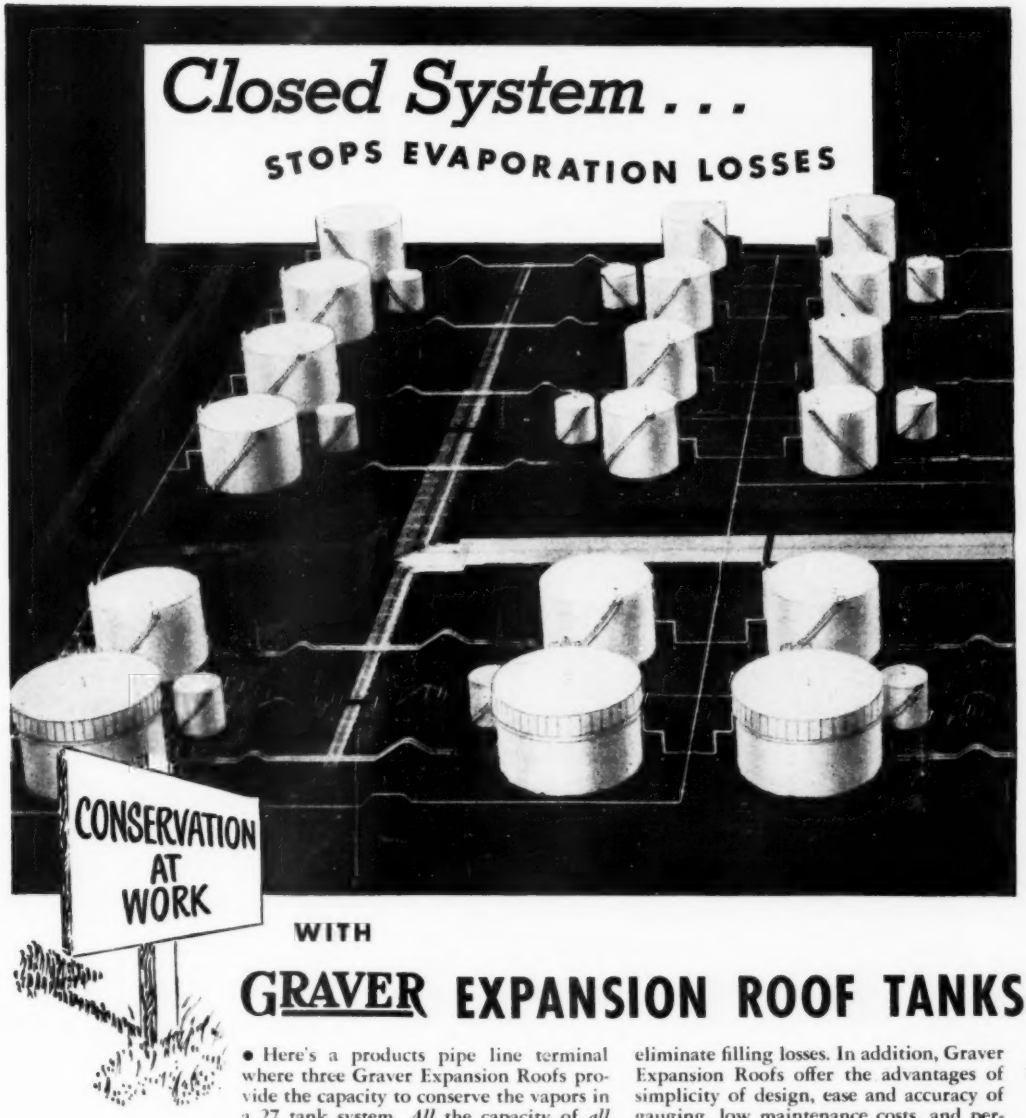
Buffalo, New York—General Offices: Harrison, New Jersey

The Good Right Hand of Industry

POWER TRANSMISSION: sheaves, V-belts, variable speed drives

PUMPS: centrifugal, power, rotary, steam

AIR COMPRESSORS: water-cooled, air-cooled



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GRAVER EXPANSION ROOF TANKS

● Here's a products pipe line terminal where three Graver Expansion Roofs provide the capacity to conserve the vapors in a 27 tank system. *All* the capacity of *all* the equipment is employed, because no venting can occur until all Expansion Roofs reach their maximum height.

Graver Expansion Roofs effectively prevent all breathing or standing losses; and when vapor volumes are balanced during filling and emptying operations, they also eliminate filling losses. In addition, Graver Expansion Roofs offer the advantages of simplicity of design, ease and accuracy of gauging, low maintenance costs, and perfect roof drainage.

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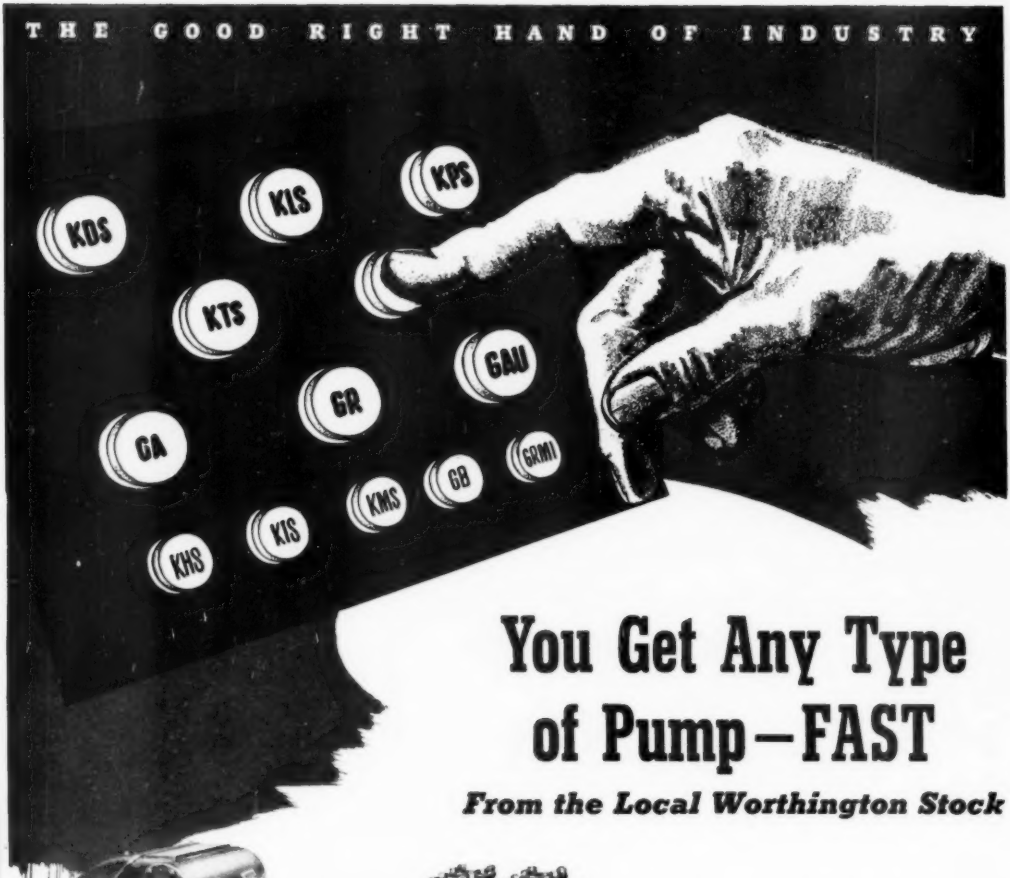
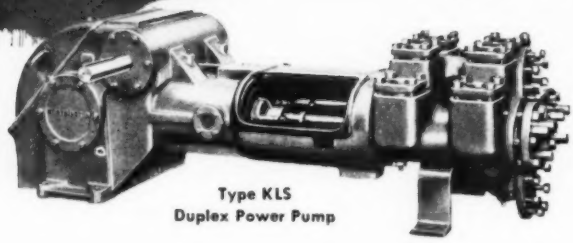


You Get Any Type of Pump—FAST

From the Local Worthington Stock



Type KLS
Duplex Power Pump

You need a pump—*fast*. You get your *pump*—any type of pump—*fast* by getting in touch with your Worthington dealer, who is as close as your phone.

There's a Worthington dealer at every oil center, and he has large stocks of all types of pumps and repair parts. His stocks are backed up by *complete* warehouse stocks at Tulsa, Houston, New Orleans, Los Angeles and San Francisco.

Remember—there's a Worthington pump for every pumping job . . . rotary, power, centrifugal . . . in a complete range of sizes. For example—

KTS 12-in. horizontal duplex power pump in bores from 3½ to 7½ in. (by half-inches).

KDS 4-in. horizontal duplex power pump in bores from 2½ to 4 in. (by half-inches).

So remember—Worthington is *everywhere* . . . Worthington supplies *every* type of *pump*. Rely on your Worthington dealer for your rush requirements

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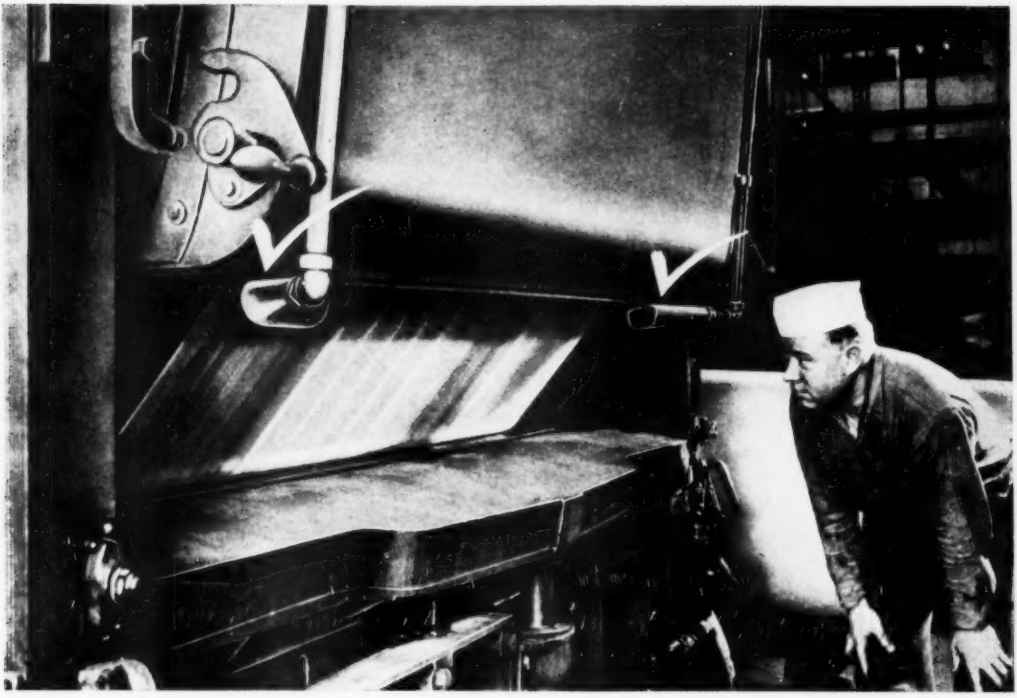
WORTHINGTON PUMP AND MACHINERY CORPORATION
PUMP AND COMPRESSOR MERCHANDISING DIVISION
HARRISON, NEW JERSEY

The Good Right Hand of Industry

POWER TRANSMISSION: sheaves, V-belts, variable speed drives
PUMPS: centrifugal, power, rotary, steam
AIR COMPRESSORS: water-cooled, air-cooled

"We've put out more than one fire here...



...and the presses started rolling again RIGHT AWAY!"

When you *have* to use flammable solvents in a room filled with static electricity—you *must* guard against the possibility of fires. You can stop them dead in their tracks—before a bit of damage is done.

The New York Daily News *proved* this when it installed a *Kidde** Built-in System in its rotogravure press room. Those fires that *have* started never got to first base! The *Kidde* equipment put them out in just a few seconds. No fire damage—no downtime for after-fire clean-up—because the carbon dioxide (CO_2) from a *Kidde* System leaves no mess behind. The presses were ready to roll the instant the blaze was killed!

Wherever there's a tricky fire hazard, Kidde is ready with the answer! If *you* have a fire protection problem, a Kidde representative will help you.

When you think of CO_2, call Kidde!

*Also known as "LUX"

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

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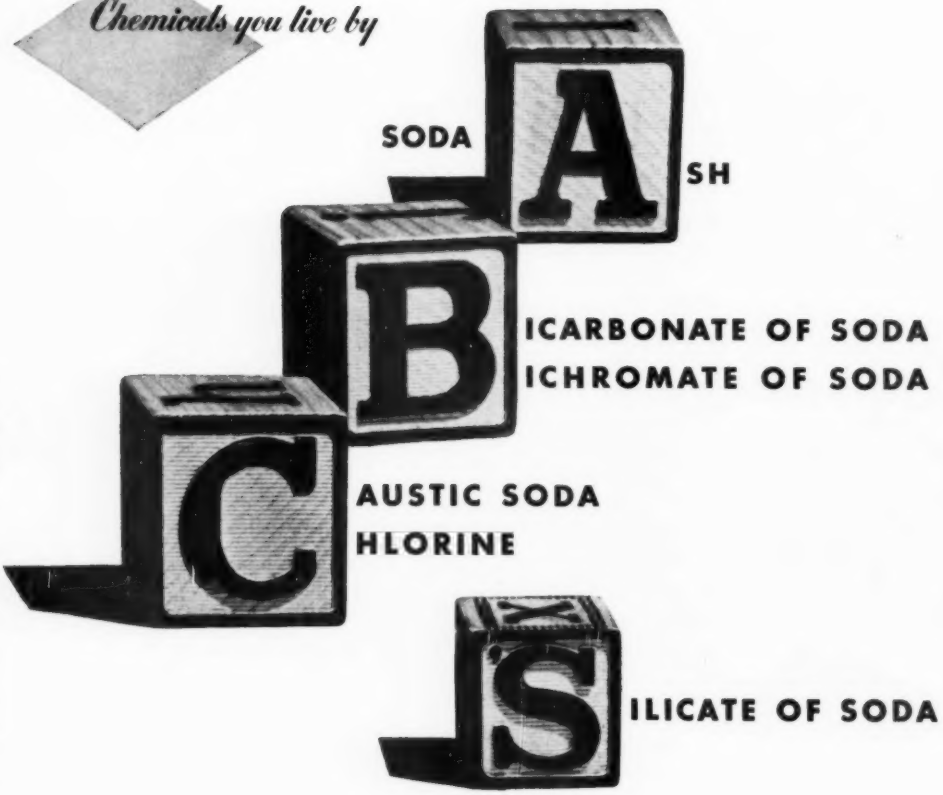

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Whether your chief interest is in production or in refining, you use many of the chemicals DIAMOND ALKALI makes. That's why our plant locations and our service are being directed more and more to meet the needs of the oil industry.

You will find DIAMOND plants paralleling the oil industry's operations from the Southwest to the Atlantic; DIAMOND ALKALI Sales Offices spotted in convenient cities from Texas to New England.

When considering your future needs for the ABC's of chemicals, remember DIAMOND's ability to serve you. And if you are having technical problems relating to these chemicals, we will be glad to lend our assistance in solving them. Just get in touch with our nearest sales office, or write us direct.

DIAMOND SALES OFFICES: Boston, New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Wichita, Oklahoma City and Houston. Also representatives in other principal cities in the United States.

DIAMOND CHEMICALS FOR THE OIL INDUSTRY

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THE DRILLING INDUSTRY'S BEST SELLING

CORE REEL

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With Waukesha MZAU Engine
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Prices FOB Wichita Falls

The WILSON Core Reel has spooling capacity of 12,000 feet of 5/8" wire rope or 15,000 feet of 9/16" wire rope. Recommended for use in taking wire line cores on wells up to 15,000 feet in depth, and can be furnished with either gasoline, butane, or diesel engines, used in conjunction with a four-speed truck type transmission. With 8" wide, full wrap brake on a 36" diameter, the unit has ample braking capacity for any depth of coring.

Coring with this type unit has a definite advantage over a core reel mounted on the drawworks with the drawworks engines as power. With the Wilson Core Reel, it is not necessary to operate the large drilling engines or other drives for this light operation. In stock. Available for immediate delivery!

Wilson **MANUFACTURING CO., Inc.,** Wichita Falls, Texas

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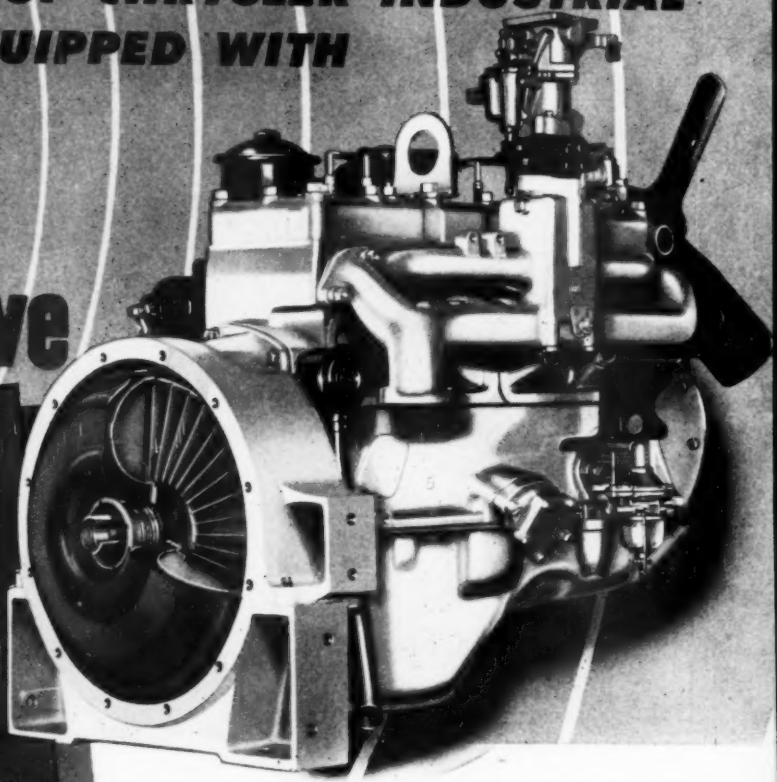

- ABSORBS SHOCK OVERLOADS
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With gyrol Fluid Coupling, Chrysler Industrial engines now offer exclusive new operating advantages to builders and operators of many types of gasoline-powered machines.

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Statistics of Oil and Gas Development and Production — 1949

(Covering Developments of 1948)

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OVER 6000 OILFIELDS—REPORTED INDIVIDUALLY

This 26th annual volume of a series published by the American Institute of Mining and Metallurgical Engineers is the industry's most complete and authoritative source for late information on all of the major and most of the minor producing areas of the WORLD.

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TYPICAL TABULAR FIELD DATA

Producing Formations: Name, Age, Depth, Thickness, Structure, Porosity, Pressure.

Oil and Gas: Production in 1948 and Cumulative to End of 1948; Gravity, Sulfur.

Oil and Gas Wells:

Completed to End of 1948; Completed in 1948, Abandoned in 1948.
Producing at End of 1948; Showing Flowing and Artificial Lift.

General: Acreage Proved, Deepest Test, Secondary Recovery Projects.

TYPICAL WILDCAT WELL DATA

Location · Depth · Horizon · Operator · Initial Production · Production Method

The volume will be ready for mailing in September, 1949. Printing order will be based on requirements of the AIME membership plus the advance orders received from this announcement. No provision will be made for surplus copies so you can only be sure of receiving this valuable book by ordering now.

Book Department, Petroleum Branch, AIME
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When the AIME volume "Statistics of Oil and Gas Development and Production — 1949" is ready please mail_____copies at $6.00 per copy, to the address below. Enclosed find check for $_____made payable to the AIME (or company purchase order) in full payment of this order.

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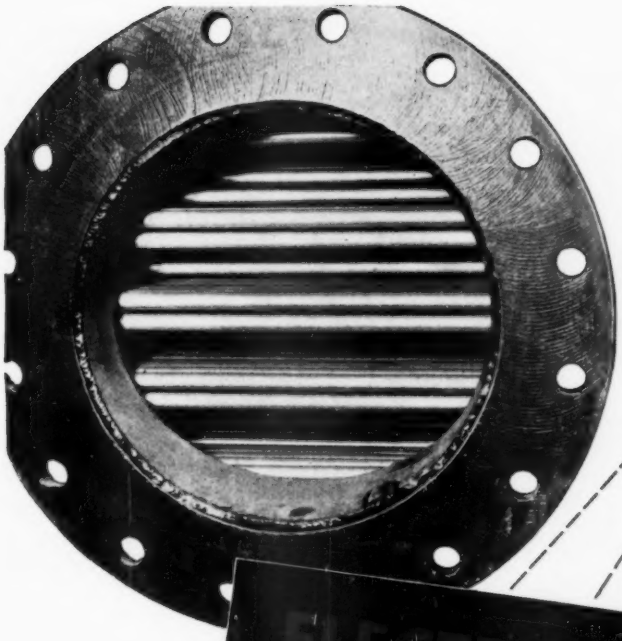
How 'safety-circle' driving cuts down accidents

"Know your safety-circle!" is an important lesson taught Standard of California drivers...and perhaps it can be helpful to you.

Your safety-circle is the distance you need to meet an emergency situation—a car stopping suddenly ahead, for example. Our drivers get a special test which tells them exactly how fast they react, but in general, it takes the average person a full second to see a hazard, think what to do and act. So, driving on a clear road, at 30 miles an hour, you should stay at least 7 car lengths behind the car ahead; when you drive 45 miles an hour, stay behind 13 car lengths.

More than 5,000 Standard drivers have studied this and many other safety principles in our Driver Training Program, besides passing thorough visual examinations. Last year, they drove 41 million miles with an accident rate 60% lower than the national trucking fleet average.

STANDARD OIL COMPANY
OF CALIFORNIA
plans ahead to serve you better



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ELECTRUNITE Stainless Steel Pressure Tubes

When retubing costs enter the maintenance picture, it's time to consider the multiple advantages of Republic ELECTRUNITE Stainless Steel Tubes for heat exchangers, condensers and evaporators.

Made of long-lasting ENDURO Stainless Steel, these tubes furnish the unsurpassed resistance to heat and corrosion, sanitary properties and other advantages of stainless steel. As manufactured by Republic's improved welding processes, each length is uniformly round and sound, free from surface seams, laps and slivers. *Full annealing* of all ELECTRUNITE Stainless Steel Pressure Tubes assures unvarying high ductility throughout every shipment.

Why not check *today* to determine whether a new perspective on stainless steel pressure tubes might result in profitable cost-savings for your company? *Write, wire or phone* for information specifically related to your operations.

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Hewitt Tank Car Hose speeds gasoline and oil delivery in suction or discharge service

You can be sure of top-flight performance with Hewitt Tank Car Hose in suction or discharge service.

That's because it's reinforced by a spiral of round steel wire which *prevents collapse* under suction and lends strength to wall reinforcement for discharge service. Inside, its smooth, oil-resisting synthetic rubber tube does not flake off—*resists internal swelling* to help assure maximum flow.

No wonder operators of refineries, gasoline and oil bulk stations save money with this hose that's so sturdy and flexible, yet light-weight and compact!

There are many other reasons why you can count on long life from Hewitt Tank Car Hose. Among them is the fact that its cover resists abrasion, sun-checking, and cracking —stays flexible.

Plan now to cut your loading and unloading costs with Hewitt Tank Car Hose. For details phone the Hewitt distributor listed in the classified section of your phone directory. Or write to Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

HEWITT

TANK CAR HOSE

OUTSTANDING CONSTRUCTION FEATURES OF HEWITT TANK CAR HOSE

1 Noncollapsible. Spiral of round steel wire, interspersed between multiple braids of strong cotton cord prevents collapsing under suction—dissipates static electricity.

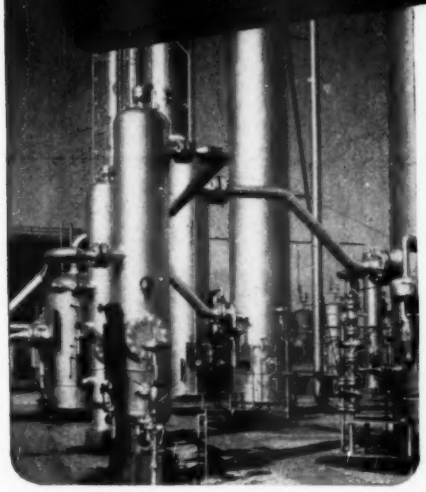
2 Nonflaking. Smooth, gasoline-resisting synthetic rubber tube does not flake off or swell when in constant contact with oil or gasoline—assures maximum flow.

3 Nonabsorbing. Cover keeps moisture from seeping into carcass —prevents stiffening in freezing temperatures—keeps hose flexible.

4 Nonweathering. Special purpose, extremely tough, oil-resisting cover is compounded to resist sun-checking and cracking.

HEWITT RUBBER DIVISION **HEWITT-ROBINS INCORPORATED**

Stop Costly Rust!



- Easy to use — Rust-Oleum coats metal with a firm, tough, pliable, moisture-proof and drying film that lasts years longer.
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Stops Rust!

This industry-proved coating lengthens the life of metal equipment. Rust-Oleum positively stops rust and gives long-lasting protection at a material cost of less than 1-cent per square foot. An exclusive formula, Rust-Oleum combats all rust-forming conditions including rain, fumes, dampness, weathering and — particularly — salt air and salt water. Avoid costly replacements. Safeguard your properties this efficient low-cost way.

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See Our Catalog in Sweet's or write for full information

They Say—

Save the Gas!

The gas reserves in Texas, and in the United States for that matter, are almost equivalent in weight and heating value to the oil reserves, and they could be almost equal in economic importance and value. Hence, their conservation is equally important. *Hines H. Baker, president of Humble Oil & Refining Co., August-September "Progress," Southern Gas Association.*

Likes Semiannual Issue

Sir:

Congratulations on what I feel is a very fine issue of The Oil and Gas Journal; namely, the July 28, 1949, edition.

In particular, I thought three of the articles were of special interest to a large number of the readers. These were "Design of Fintube Exchangers," "Cost-imating of Pipe Stills," and "Engineering Fundamentals of Retrograde Condensation."

May I have a spare copy of this issue so that we will not have to disturb our company library copy.

Yours very truly,
W. H. Marchant,
Refinery Chief Engineer,
Southwestern Engineering Co.

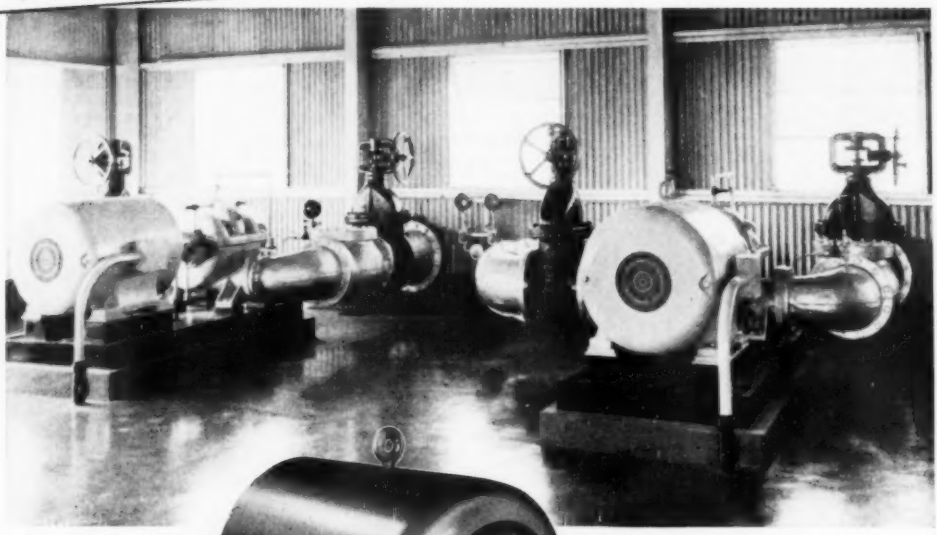
Future of Geology

Sir:

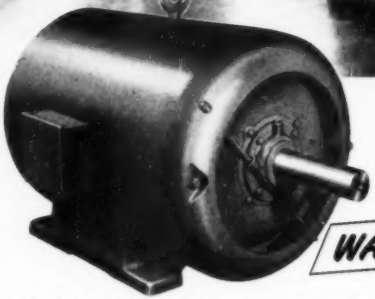
The heyday of the "old" geologist is almost over. In the first three decades of this century the large majority of our lucrative surface structures were mapped and drilled. During this period a large crop of millionaire geologists and oil-company executives with geological backgrounds were produced. Today with the increasing difficulty encountered in finding oil the young geologist finds heavy competition in the ranks. He usually settles for a modest paying job and hopes that his efforts will be appreciated. . . .

Subsurface studies and geophysical work are rapidly bringing to a close the second phase of petroleum exploration procedure, and also the need for a large number of geologists. The field of professional geology will be restricted to a limited few who will teach for cultural and background purposes and a limited number of geological personnel working for the Government, mining companies, and oil companies. Their duties will include the handling and classification of the mass of geologic data accumulated in the past, and

Pretty... but oh so TOUGH!



Wagner 100 hp totally-enclosed, fan-cooled motors driving water circulating pumps at a Texas refinery.



WAGNER CP MOTORS

Don't let their neatness fool you. These 100 hp Wagner totally-enclosed, fan-cooled motors do a giant-sized job—driving water circulating pumps at a Texas refinery.

Motors that drive pumps and compressors find the going tough. They must overcome back pressures set up by fluids or gases—they are often required to make repeated starts and stops—they are sometimes kept in continuous service.

But Wagner Motors can take it. There is a Wagner Motor correctly engineered to meet the requirements of every type of pump or compressor. You can choose the motor to fit your need from the wide variety of types and sizes in the Wagner line. Bulletin MU-185 gives full details.

Buyers of Wagner Motors get Nationwide Service! More than 450 Wagner Authorized Electrical Service Stations and Parts Distributors *plus* 25 Wagner-owned Service Branches are ready to immediately supply on-the-spot service, factory guaranteed exchange motors, or genuine Wagner parts. Write for Bulletin MU-24 for complete list.

Wagner Electric Corporation

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Consult Wagner Engineers on all Electric Motor Problems

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M40-17

acting in a general advisory capacity on the broader aspects of exploration work. A few geologists will be used in construction work and engineering work.

Today hundreds of young people just out of school with degrees in geology are finding difficulty in getting jobs as geologists. They are not finding the doors open as their predecessors did in 1948, 1947, and 1946. Employers are becoming very selective insisting on Ph.D.'s and graduates with several years of experience. The experienced man is in on the ground floor. The newcomer will find the going rought whereas the young physicist, chemist, M.D., and other young scientists will find a world of opportunity waiting for them with unlimited possibilities. . . .

Instead of giving publicity to geology as a career, it should be pointed cut that geology is one science that will have a limited professional existence. Fewer and better students should be turned out. Emphasis should be placed on turning out a graduate thoroughly steeped with physics, chemistry, and mathematics, with the necessary geologic background. He will need this training to cope with the changes that will take place in his life time.

Completion of successful geophysical methods in finding oil with depth will inaugurate the third and final phase of oil exploration. This will probably take place within the next two or three decades.

Our present crop of geologists can take care of oil and mineral exploration for the next 25 years. By that time in view of what has taken place within the past 25 years in discoveries and scientific advancement, there will no longer be an urgent need for the "rock hound" in the sense of the word.

Dan Kralis,
Manager and chief geologist,
Exploration Division,
Sunland Refining Corp.

Furnace Oil Demand

There is every indication of a sharp increase—of from 20 per cent to 30 per cent—in the consumption of heating oils during the approaching winter as compared with last winter, even if only normal cold is experienced. If an extra cold winter comes upon us, then the increase in consumption will be very much more. *Shell Oil Co., Inc., statement.*

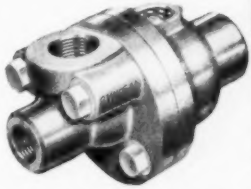
Tourist Comments

This city (Billings, Mont.) must have been founded by pioneers who were trying to hide from either the Indians or the elements. It is built in a broad valley, flanked by high mesas—which make it hot in summer and warm in winter.

Chamber of Commerce calls it "the

DESIGNED TO SAVE *You* MONEY!

After several years of research and development, CHIKSAN is now ready with two new types of High Temperature Joints which represent the latest in design and performance. They are built specifically to answer the many problems encountered in the handling of steam and other high temperature fluids on rotating equipment and in flexible lines.



Maximum Working Pressure—150 lbs. steam.
1", 1½" and 2" sizes now available. Other sizes under development.
Cadmium Plated Chrome Seal Face.
Rotating speeds, 150 to 300 R.P.M.
Built to serve. Built to last.

NOW!

CHIKSAN HIGH TEMPERATURE ROTATING JOINTS

Designed and built for use on rotating drums, platens, tumblers, etc. This new Rotating Joint will handle steam, hot oil, water, brine, etc. Rotation may be constant or intermittent. The service may be hot or cold. A positive seal prevents leakage at all times. Packing chamber is hard-chrome plated. All parts are resistant to rust and corrosion.

Made in 8 different styles for turning in 1, 2 and 3 planes.
1", 1½" and 2" sizes now available. Other sizes under development.
Positive Metallic Seal.
Maximum working pressure 300 psi.
Maximum temperature, 600° F.

NOW!

CHIKSAN HIGH TEMPERATURE SWIVEL JOINTS (Metallic Seal)

These new Joints set new performance standards wherever steam or other hot fluids are handled through flexible lines. The Metallic Seal provides positive protection against leaks. Full 360° turning on stainless steel ball bearings which help to absorb radial and thrust loads. Unlimited flexibility is possible simply by arranging the swivels in proper sequence.

COMPLETE ENGINEERING DATA

Write for illustrated bulletins and see for yourself how these new CHIKSAN Joints can help you cut leakage losses, operating and maintenance costs, and shut-down time now required for frequent repairs and replacements.

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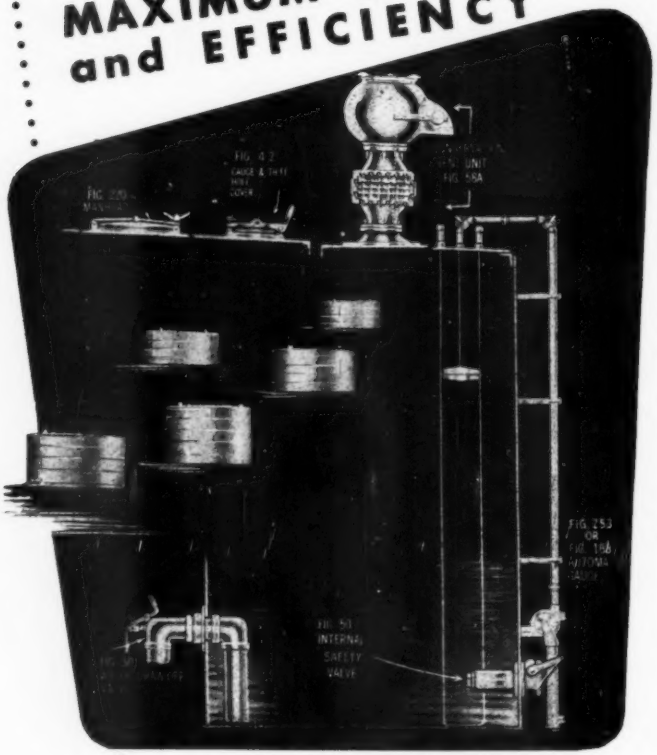
BALL-BEARING SWIVEL JOINTS FOR ALL PURPOSES

DESIGN YOUR LIQUID STORAGE FOR
MAXIMUM SAFETY and EFFICIENCY



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PROVED & APPROVED
TANK EQUIPMENT

Will you be planning additional storage facilities for your liquid products? If so, you'll want your tank builders to meet strict requirements for all your tanks, but you can make doubly sure of safe and efficient storage by including "VAREC" equipment in your plans.

There are "VAREC" Tank Equipment and Safety Devices for all type of tanks . . . and for all types of storage problems. Your file copy of the "VAREC" P-7 Catalog has full details.

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friendly center," and Montana Unlimited uses the same phrase to refer to the state. There seems to be some sort of a deal that the natives always speak to the visitors and the cops will draw you a picture for directions.

Billings always has been an oil town; it didn't boom and bustle like other cities of the Rockies; it has grown slowly and surely. . . . *Claude V. Barrow, oil editor, Daily Oklahoman, opening of new Carter Oil Co. refinery.*

Middle East Lament

Had we succeeded in getting Middle East oil placed under an agency of United Nations, oil imports into the United States would not have been exclusively in the hands of the majors, nor could such imports have been employed, consciously or unconsciously to play havoc with petroleum independents. *Howard A. Cowden, president of Consumers Cooperative Association, address before American Institute of Cooperation in Madison, Wis.*

Cost of Offshore Oil

At present, the oil industry is estimated to be spending 5¼ million dollars a month on offshore operations—1¼ million for geophysical exploration and 4 million for drilling and development. Much more money, time, and effort will be required to produce significant quantities of oil from the Continental Shelf. *Humble Way, Humble Oil & Refining Co.*

Idle Tongues

If we aren't careful, we may overemphasize the normal and perhaps desirable readjustments now under way and talk ourselves into hard times. The likelihood of a depression is common talk. "Recession," "shakedown," "deflation" are becoming the most widely advertised products on the nation's shelves. We have statistics of unemployment thrown at us daily, but no statistics of idle tongues which unquestionably outnumber the idle hands. *W. Alton Jones' message in "Service," by Cities Service Co.*

Field Processing

Sir:

Will you kindly send me 15 copies of your very excellent picture chart "Guide to Field Processing," August 18 issue. I would like to send these to some of our sales engineers because it will be very helpful to them in understanding newer trends in the oil and gas industry.

Very truly yours,
S. P. Bordeau,
Manager, Technical Publications Department,
Electric Machinery Mfg. Co.,
Milwaukee, Wis.

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JOURNALLY Speaking

Ladies' Department

THIS department is in grave danger of becoming the women's page. At least, among the vast array of important information imparted herein, the items which have attracted most attention have been those dealing with the feminine contingent of the oil industry, particularly the formation of Desk and Derrick Clubs among the secretaries of oil companies in various places.

Our most recent communication is from a man who says he is too modest to let his name be printed (maybe he is a confirmed bachelor) but whose letterhead says he is Coordinator of Petroleum - Industry Training of the Bureau of Industrial Teacher-Training of the Division of Extension of the State University of an exceedingly large oil-producing state.

He offers to help what he coyly calls the Eves of oildom achieve their goal of becoming better informed on the mysteries of the oil industry. As qualifications for this pleasant task, he says he has conducted courses in "What the Well-Trained Secretary Should Know About the Oil Industry" given by the West Texas Geological Society at Midland, the Casper (Wyo.) Junior College, and a large oil company in Houston.

If any of the oil gals would like his assistance in setting up similar courses of self-improvement, this department will pass the requests on to the retiring professor, in complete confidence, of course. However, it is our impression that the objective of this Desk and Derrick movement is at least two parts social and not more than a maximum of one part education.

The professor ends his letter "Yours for more enlightenment at the Desks and more ladies at the Derricks." The first part of that sentence is fine, but the last part may be carrying things a little too far.

Refinery Figures

IMAGINE a football field paved with concrete 16 ft. deep. Don't ask us what good it would be, but Standard Oil Co. (Ohio) says that's how much concrete is being used in constructing its new refinery at Lima.

It's so hard for the ordinary guy to visualize the size of some of these big construction projects that it's a big help when the statisticians obligingly furnish simple comparisons like this.

For instance, the steel in the towers and drums going into the Lima plant would make a steel sidewalk ¼ in. thick, 3 ft. wide, and 51½ miles long, while with the structural steel included it would make a wire ⅛ in. in diameter and long enough to circle the earth at the equator. Now you begin to get a clearer idea of the size of a modern refinery.

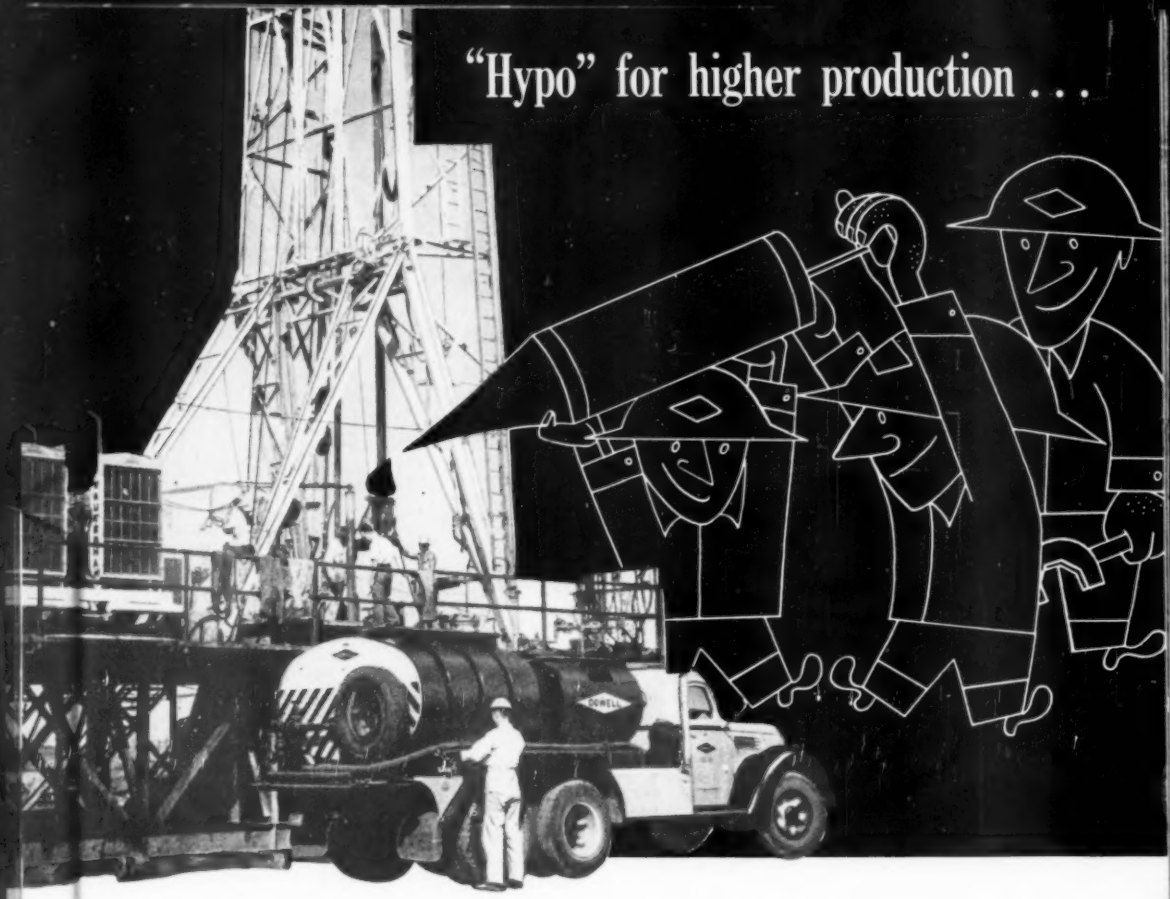
When it gets to going, this refinery will use 8.74 times as much water as is used every day by the entire city of Lima; it will use fuel equivalent to 20 carloads of coal a day; it will produce enough gasoline in 1 hour to run the average motorist 65 years, enough No. 2 fuel oil in 1 hour to heat the average home for 8 years, and three times as much gas in one day as the city of Lima used each day last February.

A $1 bill is 6⅛ in. long. Sohio will use 30 million of these in building the new refinery. If these were laid end to end it probably would be found that the construction cost is sky high, but just how high you'll have to figure out for yourself; the company's release didn't say and our statistician is on vacation.

Social Note

WANT to give a party? You don't have to call on Emily Post, Elsa Maxwell, or Perle Mesta. The Oil Industry Information Committee will tell you how. It has just put out a little book on how an oil company should hold an open house at its plant, giving all the details including suggestions for invitations, decorations, and refreshments. We're all for bigger and better open houses, especially those with good refreshments.

—*Henry D. Ralph*



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Here's why a "whirler" shoe "centered" in the hole is your best bet for cementing success

Out of the many different varieties of efficient shoes and collars for landing and cementing casing in a well, there is one outstanding combination for successful initial cementing—the BAKER CEMENT WASH-DOWN "WHIRLER" FLOAT SHOE (Product No. 120) used with BAKER Model "G" CASING CENTRALIZERS (Product No. 910-G).

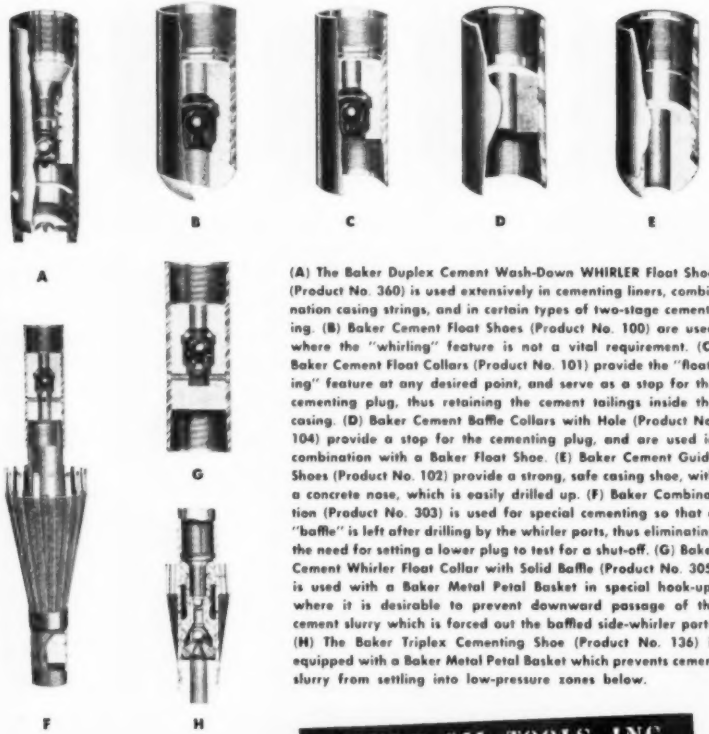
This superior shoe has ample strength to float in the longest, heaviest string of casing, with the exclusive Baker "Whirling" action to wash away bridges and condition the hole. Then, with the shoe and the first few joints of casing "centered" in the hole by Baker Casing Centralizers, the cement slurry is WHIRLED upward, and a uniform body of cement is placed *all around* the casing. Danger of channeling is minimized, and "first time" results are almost invariably secured.

Remember always that the Baker Cement Wash-Down WHIRLER Float Shoe is not merely a side-opening shoe, but it embodies the exclusive "Whirler" principle which has no equal for proper cementation.

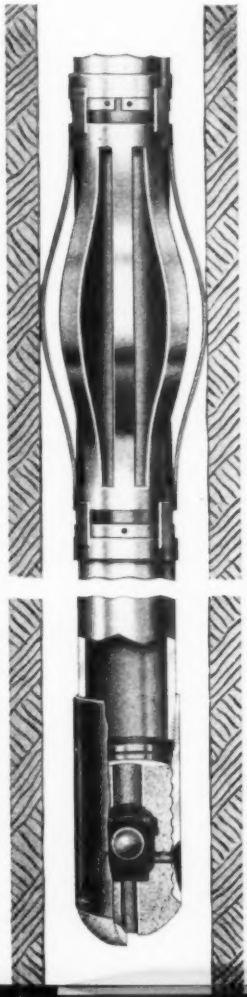
"HEADQUARTERS" FOR CEMENTING EQUIPMENT

Baker also offers the widest variety of products and equipment to perform special and remedial cementing, a few popular items being pictured here. Whether you have a routine cementing job, or must have a custom made hook-up for a difficult "life saving" operation on your well, there is a Baker product to meet your exact needs.

It will pay you well to check with the Baker representative in your area before you undertake *any* cementing work. Helpful suggestions, and courteous, intelligent cooperation are yours for the asking.



(A) The Baker Duplex Cement Wash-Down WHIRLER Float Shoe (Product No. 360) is used extensively in cementing liners, combination casing strings, and in certain types of two-stage cementing. (B) Baker Cement Float Shoes (Product No. 100) are used where the "whirling" feature is not a vital requirement. (C) Baker Cement Float Collars (Product No. 101) provide the "floating" feature at any desired point, and serve as a stop for the cementing plug, thus retaining the cement tailings inside the casing. (D) Baker Cement Baffle Collars with Hole (Product No. 104) provide a stop for the cementing plug, and are used in combination with a Baker Float Shoe. (E) Baker Cement Guide Shoes (Product No. 102) provide a strong, safe casing shoe, with a concrete nose, which is easily drilled up. (F) Baker Combination (Product No. 303) is used for special cementing so that a "baffle" is left after drilling by the whirler ports, thus eliminating the need for setting a lower plug to test for a shut-off. (G) Baker Cement Whirler Float Collar with Solid Baffle (Product No. 305) is used with a Baker Metal Petal Basket in special hook-ups where it is desirable to prevent downward passage of the cement slurry which is forced out the baffled side-whirler ports. (H) The Baker Triplex Cementing Shoe (Product No. 136) is equipped with a Baker Metal Petal Basket which prevents cement slurry from settling into low-pressure zones below.



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THE OIL AND GAS JOURNAL

The Next Step

THE next mandatory step in bringing about continued improvement in the oil business from the maladjustments of the first 6 months is a general recovery in refinery markets.

Starting early last year, refinery quotations began to reflect the fact that supply was catching up with demand and prices dropped from the 1947 highs when shortages threatened. As output continued upward and stocks increased prices declined until March and April this year.

In recent weeks, owing to an improved statistical situation east of the West Coast, there has been scattered improvement in fuel-oil and distillate prices. On the West Coast operators still have a weak market in the heavier products, which accounts for the additional price reductions last week.

The improvement east of and including the Rocky Mountain states, has been brought about primarily by the drastic reductions in Texas crude-oil output. Economists agree that a substantial increase in crude-oil requirements is a certainty for the remainder of the year. This fact, plus the corrections in operations that have been made over the past few months, gives the industry a stronger statistical position in production activities.

An adequate recovery in refinery markets is yet to become effective, and unless it does past history shows that all the other efforts for improvement will prove futile. The Mid-Continent product-market situation reflects general conditions. The refinery realization curve published weekly in the Journal's statistical section shows a reduction from a high of $3.96 in early 1948 to a recent low of $2.92. It is now $2.95.

Actual realizations will, of course, vary from plant to plant and in some cases operators have protection through contracts. But it is true that regardless of individual positions, margins for refinery operations have been inadequate, forcing some plants to shut down with others able to operate only because of profits in other divisions or because they are able to draw on reserves accumulated in a more prosperous period.

Viewed from any angle this is not a healthy situation. A balancing in supply and demand in oil operations has no permanent significance until it extends to the market places where buyers and sellers meet daily in the disposal of finished products.

It is not contended that product prices should go back to the peaks of last year and late 1947. That was an abnormal period when realizations based on spot sales were on the high side in relation to posted crude-oil price schedules and refinery operating costs. But a recovery of 50 or more cents per barrel is necessary at most plants, and for this season of the year it probably will have to come from products sold as fuel and burning oils. The accomplishment of this objective is an obligation not only of refiners but also of those who have the responsibility of balancing crude-oil supply with current needs.

Freight-Rate Increase to Hurt Small Refiner; Hits Heavy Fuel

by John C. Casper

THE new increase in freight rates, effective September 1, is adding new problems for portions of the petroleum industry. It is building still higher fences that restrict the marketing area of the small refiner. It makes the production of residual fuel oil even less profitable than in the past.

Late last year an interim increase in rates was granted amounting to 5 per cent in southern and eastern states and 4 per cent in western territories. This has been replaced by an increase of 10 per cent in the area east of the Mississippi River; 9 per cent in Zone 1, including Wisconsin, upper Michigan, eastern Minnesota, Iowa, and northern Missouri; and 8 per cent in the western territory.

Because of the strong competitive position, petroleum has been given a partial exemption in a few of the past increases, and shippers feel that something still may be done about this latest advance.

Historically, increases in rail rates have been followed by decreases in the volume of petroleum traffic. The new rates on gasoline from points in Group 3 to Chicago or Minneapolis are about 2½ times the pipe-line rate to these points.

This inability to compete with pipe lines on the long hauls has cut the volume of crude and products moving in tank cars. Domestic demand for petroleum products has increased 145 per cent in the past 20 years. In the same period, petroleum tonnage originated by Class I railroads has decreased 5 per cent.

GASOLINE FREIGHT RATES
(Cents per gallon)

Group 3 to—	June 1941	July 1946	Sept. 1949
St. Louis	1.914	2.046	2.970
Des Moines	1.914	2.046	3.102
Omaha	1.914	2.046	2.970
Peoria	2.178	2.310	3.498
Chicago	2.376	2.508	3.762
Madison	2.442	2.574	3.828
St. Paul	2.442	2.574	3.696

CRUDE AND PRODUCTS ORIGINATED BY CLASS I RAILWAYS

	Thou. cars	Thou. tons	Revenue, thou. dollars
1928	2,345	69,012	369,456
1938	1,934	56,933	248,119
1948	2,116	65,407	418,730

Petroleum accounted for almost 11 per cent of the total car-load revenue in 1931, but by 1948 it had dropped to less than 6 per cent. Petroleum tonnage moved by railroads in 1948 decreased 1.8 per cent from 1947 but produced more revenue because of increased rates.

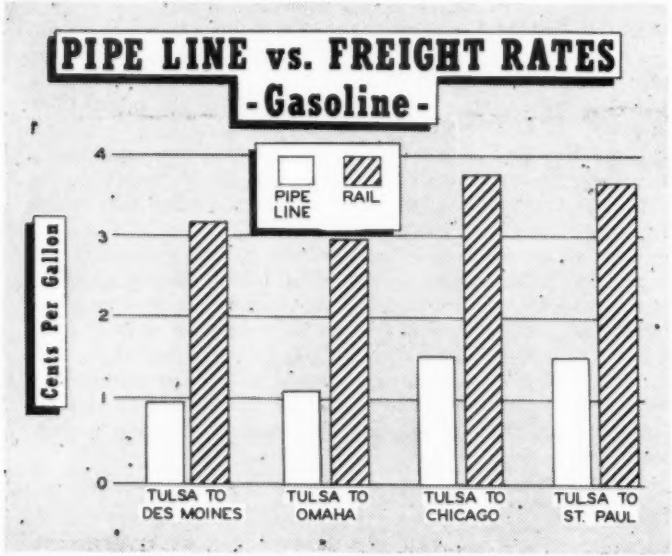
Small refineries, for the most part, are located near crude production. They supply a local market and ship the surplus to areas of greater demand. When group rates were first established, an attempt was made to set the rates so that these shipments would be fairly competitive with products produced near the point of consumption from crude received by pipe line. For example, the rate to Chicago, a refining center, was less than to Minneapolis.

The series of varying percentage increases has reversed the rate relationship for these points, but it matters little to the Mid-Continent refiner. He can't afford to ship to either point unless he is on the pipe line and is making pipe-line-grade gasoline.

Residual fuel continues as a major problem for the inland refiner. It is the one product that has consistently sold for less than the crude from which it is made. It must compete with coal in the East and with natural gas in the Southwest. It can't be moved by pipe line.

The refiner located near water transportation has a cheap method of transportation to industrial areas, but the inland refiner must ship by rail. The new rate increase moves him a little further behind the "eight ball" on his residual fuel production.

Railroads have started a program designed to meet short-haul competition in the movement of petroleum products. In most districts, they have met or are meeting truck rates. On the other hand, there is nothing to indicate that they expect to share in the increasing long-haul business.



Standard Claims World's Deepest Producing Well

LOS ANGELES.—A new world's record depth for a producing well was claimed September 2 by Standard Oil Co. of California.

The new record-setter is the company's 5 Mushrush in Wasco field of Kern County, California, which came in flowing by heads from the interval 15,440-75 ft.

The previous record was claimed both by Shell Oil Co., Inc., and Pure Oil Co.

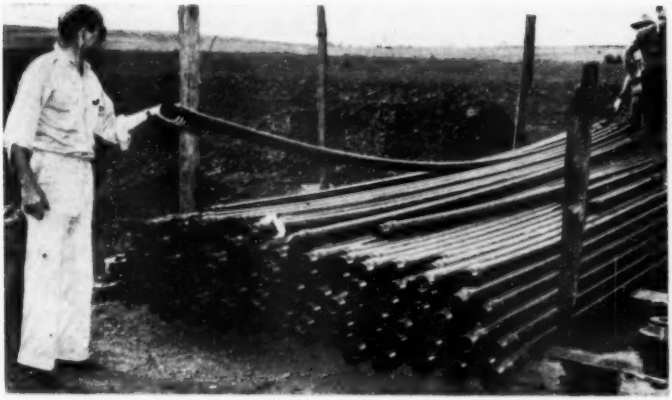
Shell's 1-A Smith in Weeks Island, Iberia Parish, Louisiana, is producing from perforations at 14,243-55 ft., but was still in the producing sand at 14,350 ft.

Pure's deep well in West Poison Spider field, Wyoming, is producing from lower perforations, at 14,307 ft., but was bottomed at that depth.

The new California Standard well is producing from a new oil zone in an Eocene sand. Initial production was reported at 96 bbl. per day of 40.7 -gravity oil with 480,000 cu. ft. of gas at 75-psi. tubing pressure.

The company said, however, that if it failed to clean up after swabbing and give a better flow it probably would not be kept in production.

Present production in Wasco field is from the A-2 zone at about 13,000 ft.



Above: The new 2½-in. extra-heavy plastic pipe weighs only .826 lb. per ft., so one man can easily move a half dozen or more of the 20-ft. joints. Right: Harry T. Black, N.C.R.A. oil production superintendent (right), is checking threads at top of the first plastic joint to run in the 3,387-ft. tubing string; at left is Keith Bidwell of K-B Well Servicing Co., which ran the tubing

First String of Plastic Tubing Run

3,387-Ft. Lightweight String Is Run In Kansas Salt-Water Disposal Well

GREAT BEND, Kans.—The first string of all-plastic tubing ever to be used successfully by the petroleum industry in any type well was run into a salt-water-disposal well last week on the Harbareck lease (NW 7-16s-10w). The string was 3,387 ft. of 2½-in. extra-heavy threaded plastic tubing. It weighed 1½ tons in comparison with approximately 17½ tons for the 3-in. cement-lined steel tubing (2½-in. i.d.) which is usually used in this service.

The installation was supervised by M. C. (Jack) Green, president of Green Contracting & Engineering Co., Inc., Wichita, who furnished the tubing, and Harry T. Black, superintendent of production for National Cooperative Refining Association, (lease operator and coowner with Aledo Oil Co., Aledo, Ill.), and Keith Bidwell of K-B Well Servicing Co.

The well is 3,590 ft. deep and the 3,387 ft. of plastic tubing was run in about 4½ hours. Toward the end of the job one joint was being run every 45 to 60 seconds. Green said that with experience gained through the first installation, future jobs could be more quickly and easily made. R. M. Langdon, superintendent of production for The Texas Co. at Chase, said that the second installation of plastic tubing would be coming up within a week on a similar salt-water-disposal system on a lease south of Ellinwood.

The Green company developed the use of the pipe (trade-marked "Pressure-Plastic") in conjunction with engineers of Carter Products Corp., Cleveland, whose past experience has been in the manufacture of lightweight welded plastic pipe for irrigation and low-pressure gas service. Physical properties of the plastic material, which is basically cellulose acetate butyrate, are:

Specific gravity, 1.18 ±5%.
Impact strength, 1,200 ft.-lb. per in. notched.
Tensile strength at 77° F., 4,400 psi.
Tensile strength at 158° F., 3,000 psi.
Tensile at first sign of stretch at 70° F., 3,005 psi.
Flexural strength at yield at 70° F., 4,800 psi.
Compressive strength at yield at 70° F., 3,600 psi.
Thermal expansion (average), 6.1 to 9.4 × 10⁻⁵ in. per °F.

First joint of plastic pipe ever to be run in a deep well, starts down the hole, part of a 3,387-ft.-long string

Burning rate, slow.
Water absorption, 24 hours per $^1/_8$ in., 1 to 2 per cent.
Modulus of elasticity (tension), 2×10^5.
Sunlight resistance, excellent.
Dielectric strength, 400 volts per mil $^1/_8$-in. thickness.

The Harbarcek well will be used for injection of salt water produced from that and nearby leases and will have 8,500 ft. of plastic pipe installed as gathering lines in the disposal system. Main reason for installing the extruded plastic pipe (Carlon "B") was that, like all plastics, it will not corrode. Moreover, it cannot form galvanic couples and therefore electrolytic action does not occur.

The developers are pointing the product for use in gravity and low-pressure lines handling crude oils including the sour type, raw natural gas, gasoline, fresh and salt water. Economic features claimed are reduced transportation and stringing costs because of low weight, ditching and backfill requirements less exacting due to flexibility and resiliency (permitting the plastic pipe to follow ditch contours and to absorb considerable shock), and chemically resistant properties. In tests it has been found that lines of this material when subjected to freezing have sufficient elasticity not to burst from expansion by ice formation. The f.o.b. price at Mid-Continent points for the $2^1/_2$-in. extra-heavy threaded pipe installed in this instance, which has a calculated bursting pressure of 900 psi., is $94.95 per 100 ft. The 2-in. standard threaded pipe, bursting pressure 550 psi., is $47.50 per 100 ft. The plastic pipe comes in 20-ft. joints.

Present at the Harbarcek installation were field and engineering representatives for Champlin Refining Co., Cities Service Oil Co., Anderson-Prichard Oil Corp., Lauck Oil Co., Sinclair Prairie Oil Co., Phillips Petroleum Co., Atlantic Refining Co., Magnolia Petroleum Co., Gulf Oil Corp., Stanolind Oil & Gas Co., Carter Oil Co., Shell Oil Co., Inc., in addition to the operators mentioned.

Total Imports in July Show Drop of 25,000 Bbl. Daily Compared With June

TOTAL crude and product imports for July, as reported by the Department of Commerce, averaged 609,000 bbl. daily compared with a June average of 634,000 bbl. The total for the month amounting to 18,875,000 bbl., does not include 120,000 bbl. of heavy fuel received by Puerto Rico.

Crude accounted for 12,797,000 bbl. of the July total. This was about 24,000 bbl. daily less than crude imports in June. Receipts from Venezuela increased slightly over the previous month but not enough to balance decreases from all other areas. Product imports were near the June level. The small increase for residual was offset by decreases for distillate and asphalt.

Total shipments to foreign countries from Continental United States were reported at 7,524,000 bbl. or almost 1,500,000 bbl. less than June. Shipments to noncontiguous territories are not included in the regular commerce exports. For the past several months, these shipments have averaged about 40,000 bbl. daily.

The drop in gasoline export for the month accounted for more than 80 per cent of the total decrease.

IMPORTS INTO CONTINENTAL U. S.
(Thousands of barrels)

	July 1949	June 1949
Crude:		
Mexico	626	826
Colombia	986	1,013
Venezuela	8,882	8,116
Kuwait	1,450	1,964
Saudi Arabia	849	1,155
Other	4	
Total crude	12,797	13,092
Barrels daily	412,805	436,400
Products:		
Residual fuel	5,705	5,385
Other oils	373	541
Total products	6,078	5,926
Barrels daily	196,075	197,533
Total all oils	18,875	19,018
Barrels daily	608,880	633,933

EXPORTS*
(Thousands of barrels)

	July 1949	June 1949
Crude	2,866	3,071
Gasoline	1,906	3,196
Other products	2,754	2,723
Total all oils	7,524	8,990
Barrels daily	242,706	299,667

*Does not include shipments to noncontiguous territories which in past months have averaged about 40,000 bbl. daily.

Ball Given Highest Award Of Interior Department

WASHINGTON. — Max Ball, now an independent petroleum consultant here, and who resigned last year as head of the Interior Department's Oil and Gas Division, was given a commendation by Secretary J. A. Krug at a ceremony at the department's auditorium August 30.

"For his contributions of lasting benefit to the Government and to the public," the citation said, "Mr. Ball merits the highest commendation of the department."

Edmonton-Regina Line To Go to Great Lakes

CALGARY, Alta.—Imperial Oil, Ltd., definitely will extend its 450-mile Edmonton-Regina crude-oil pipe line to the head of the lakes.

Plans for the 700-mile extension were announced here last week by Dr. O. B. Hopkins, vice president and director of Imperial.

The line is expected to be routed through Superior, Wis., Hopkins said, using 16-in. pipe from Regina to Gretna, Man., and 18-in. from Gretna to the lakes.

Cost of the project from Regina is estimated at $90,000,000. The Edmonton-Regina segment is 20-in. Initial movements of crude from Edmonton to Regina are planned for the fall of 1950, with the first crude to be moved through the extension the following spring.

Imperial plans to move 60,000 bbl. of crude daily through the line during summer months, when tankers will be operating on the Great Lakes, and dwindle the flow to 10,000 bbl. during winter. Flow is expected to average 35,000 bbl. daily—the amount expected to come from Alberta fields during initial operation of the line.

Imperial's Edmonton refinery, largest west of Sarnia, Ont., currently is processing about 21,500 bbl. of Leduc crude daily. The company expects to maintain this level and may later expand the refinery's capacity. The Regina refinery is now handling about 16,000 bbl. daily and the Calgary refinery 10,000 bbl. daily.

Imperial also announced that the company is planning further drilling in the Golden Spike area, about 16 miles southeast of Edmonton. It is planned to drill an extension north or northeast of the discovery well.

Texas Cuts Production Of Asphalt-Base Crude

AUSTIN.—Production in 10 Texas fields which produce heavy asphaltic base crude has been cut 3,000 bbl. daily for September by the Railroad Commission.

Fields affected are in East Central and East Texas. The reduction will have a negligible effect on the state's over-all production. Commissioner Ernest O. Thompson told the press that the reduction was the result of lessening market demand for the type of crude produced by these fields.

The cutback was effected by reducing producing days in the fields from 18 to 17. Fields involved are Como and Sulphur Bluff, Hopkins County; Alba, Coke, Coke (sub-Clarksville), Manziel (sub-Clarksville), Merigale Paul (sub-Clarksville), Norman Paul, and Yantis, all in Wood County; and Talco, in Franklin and Titus counties.

this week

INDUSTRY—Standard Oil Co. of California claims world's deepest producing well with production in Wasco field from 15,440-75 ft. . . . ¶First string of all-plastic tubing ever used in the petroleum industry is run in Kansas salt-water disposal well. . . . ¶Barnsdall Oil Co., Ogden Corp. reach agreement "in principle" on merger. . . . ¶Oil companies in California again cut prices of fuel oil, this time as much as 35 cents per barrel. . . . Reduction sends residual price to $1.25. . . . Corresponding reduction in price paid for heavy crude oil is announced by Standard of California. . . .

INTERNATIONAL—Creole Petroleum Corp. reports continued drop in number of active rigs used by company in Venezuela. . . . Little change shown in company's production. . . . ¶Government of Burma seeking funds with which to buy interest in British-owned companies. . . . ¶Shell Petroleum Co., Ltd., completes modification of tankers designed for bulk shipment of asphalt from Curacao to European markets. . . .

GOVERNMENT—President Truman again declares negotiations with Mexico for an oil loan will be reopened. . . . Announcement follows statement quoting Sen. Antonio Bermudez as saying Mexico considers the matter closed. . . . ¶Justice Department gives cold shoulder to attempt by Sen. G. M. Gillette to obtain prosecution of the Mother Hubbard suit. . . . Assistant tells Gillette suit too large and unwieldy for single trial. . . . Says other suits "at distribution level" are being prepared. . . .

TRENDS—Current reports indicate an over-all decrease in stocks last month, the first August decrease since 1943. . . . Stocks of four major products increased about 90,000 bbl. daily. . . . Refinery runs of domestic crude were higher than crude production by about 10,000 bbl. daily. . . . Further withdrawals from crude inventories are represented by crude exports, transfers, and losses. . . . Total stock drop is estimated at about 2,000,000 bbl. compared with an increase of almost 15,000,000 bbl. for August 1948. . . . ¶Strength of the distillate market is indicated by the reluctance of many suppliers to contract for 30-day deliveries at current prices. . . .

CONSERVATION—Interstate Oil Compact Commission leaders defend laws and practices of state conservation bodies. . . . Reservoir control and secondary recovery resulting in great increase in oil reserves of nation, committee reports. . . . ¶Speaker tells compact state allowables protect consumers from violent price and supply fluctuations. . . .

PIPE LINES—Imperial Oil, Ltd., definitely will extend its 450-mile Edmonton-Regina crude-oil line to head of Great Lakes. . . . Line expected to be routed through Superior, Wis. . . . ¶Mid-Valley project's construction to begin in October. . . . Company arranges for financing. . . . ¶Michigan-Wisconsin Pipe Line Co. preparing to lay 100 miles of pipe. . . . ¶Mesabi Pipe Line Co. permitted by FPC to withdraw application for proposed 400-mile natural-gas line from Iowa to Minnesota. . . .

IMPORTS—Commerce Department report shows July total imports down about 25,000 bbl. daily from June. . . . Crude imports account for change with products only slightly higher than June. . . . Criticism of imports voiced in meeting of Interstate Oil Compact Commission. . . .

An unusual aerial view of the world's largest refinery—that of Anglo-Iranian Oil Co. at Abadan, Iran. In the foreground are oil loading jetties in the Shatt-al-Arab River. The refinery, which has a crude charging capacity of 500,000 bbl. daily and a cracking capacity of 125,000 bbl. daily, is visible in the background

Compact Leaders Defend State Conservation Laws, Practices

by Henry D. Ralph

ESTES PARK, Colo.—A vigorous defense of state conservation laws as a means of increasing the nation's reserves of petroleum and protecting consumers from violent fluctuations in supply and price was made by the Interstate Oil Compact Commission at its summer meeting here September 1-3.

The entire meeting was built around this theme, and various aspects of it were developed by the speakers and committee reports. In addition, the commission agreed to further its campaign of educating the public on the benefits of state conservation by publishing a pamphlet summarizing the achievements of the compact states and several engineering and statistical studies.

The charge made in some quarters in Washington that the compact serves as a device whereby the producing states regulate production to maintain the prices of crude was denied by a number of speakers. It was pointed out that the curtailed allowables during recent months reduced production by an amount smaller than the decline in consumption so that there have been ample supplies for consumers although wasteful overproduction has been avoided.

In continuance of the policy set at its previous meeting, the commission did not discuss future supply and demand prospects, though its economics committee submitted a report on current conditions which carried an overtone of optimism for the balance of the year.

Imports Discussed

Imports of foreign oil received considerable attention, and were covered in a resolution which endorsed two statements made recently by state officials. One of these was the testimony of Gov. Frank Carlson of Kansas, chairman of the Compact Commission, before the House committee on small business, meeting in Wichita August 17, in which he demanded congressional action to regulate imports in order to protect small producers. *(The Oil and Gas Journal, August 25, page 78).*

The other endorsement was of a letter sent by Ernest O. Thompson of the Texas Railroad Commission to Rep. Ed Gossett of Texas on August 23 explaining the effect of imports on the domestic industry and suggesting that they be held to 5 per cent of market demand. This letter, as did Carlson's testimony, went into considerable detail to refute the recent charge of the U. S. Department of State that state proration has reduced production arbitrarily and inordinately. Thompson explained the operation of the conservation laws in Texas, and discussed present production and imports in the light of current statistics on stocks and consumption of petroleum products.

On the subject of tidelands, the commission adopted a resolution calling on Congress to take immediate action on the pending bill to continue regulation of oil production by the states "which will adequately and properly protect the rights of the states and which will enable the respective states to maintain the high standards of leadership heretofore shown in the field of oil and gas conservation."

Federal administration of the public lands received more than usual attention because of its importance to the host state of Colorado and other states where the Government has large holdings.

The committee on public lands reported that recently the Department of the Interior has adopted a policy, which the committee declared to be in contravention of law, of requiring competitive bidding for acquired lands, even though not known to be on structure, if any competitive interest was apparent. The committee also reported that the department is now determining whether a lease is wildcat or on structure on the date of issuance of the lease instead of on the date of the application as intended by the statute. The commission adopted a resolution calling on the Secretary of the Interior to make no changes in leasing practices without public hearings and consultation with the officials of the states concerned.

The commission accepted the invitation of the governor of Louisiana to hold the annual meeting of the compact in New Orleans December 5, 6, and 7.

Heavy Fourth-Quarter Demand Seen

ESTES PARK, Colo.—An optimistic outlook for the demand for petroleum products during the remainder of the year was implicit in the report made to the Interstate Oil Compact Commission by its economics advisory committee.

No forecast of demand was made by the committee, in compliance with the policy determined at the spring meeting of the commission, but the tone of the report indicated a belief that consumption will be heavy during the coming winter and that the oil industry will have to step up its activity considerably to fill these demands.

For example, the committee report referred to a recent forecast of the U. S. Bureau of Mines that demand in the fourth quarter of 1949 would exceed the average for this summer by more than 800,000 bbl. daily, and said: "On the basis of results to date and the Bureau's forecast for the remainder of this year, demand for the full year 1949 will be about the same as for 1948, in spite of the decrease of about 3 per cent to date.

"To meet anticipated demands," said the committee, "the Bureau of Mines estimates that 5,455,000 bbl. daily of domestic crude oil will be required in the fourth quarter, which would be 700,000 bbl. daily more than the production in August 1949."

In making the committee's report to the commission, Chairman Richard J. Gonzalez of Humble Oil & Refining Co. departed from the prepared text to remark that "if the Bureau of Mines forecast is correct, the industry has a long way to go before the end of the year." This was interpreted by his listeners as a hint that production and refining operations must be increased substantially during the next few months.

The demand for gasoline in the first 8 months of this year was nearly 6 per cent above a year ago, the committee reported, but noted that weekly data for July and August indicate a somewhat lower rate of gain for these months.

"On the other hand," it said, "demands for distillate and residual fuel oils, which showed a substantial decrease for the first 8 months, are now beginning to make a more favorable showing.

Gonzalez also took the occasion to warn the producing states that the oil industry has shifted from a summer demand peak to a winter demand peak because of the fact that consumption of heating oils is now a more dominant factor than consumption of gasoline. This year, he said, the situation has been made worse because of the deferred buying of heating oils. On this point the committee's report said:

"The industry is now approaching its peak consuming season, when the increased use of fuel oils in winter greatly exceeds the decrease in gasoline consumption. Even in the warm winter of 1948-49 demand was substantially greater than during the preceding summer. In recent normal winters the gain over the previous sum-

mers has been more than 500,000 bbl. daily, and this seasonal gain is progressively increasing as more fuel-burning equipment is installed."

In reporting on activity so far this year, the committee said that petroleum supply exceeded demand in the first 8 months by about 37,000 bbl. daily of crude oil and 68,000 bbl. daily of products, or a total of 105,000 bbl. daily.

"However," it said, "crude-oil production was reduced during the period to bring supply more nearly into line with the lower demand and to help correct the oversupply which developed in the winter of 1948-49 when stocks of all oils increased 264,000 bbl. daily instead of showing a usual seasonal decline of about that same amount.

"The reduced production for the last several months was primarily the result of the unusual conditions of last winter. The reduction finally resulted in a substantial draft on crude-oil stocks in July and August, but stocks at the end of August were still higher than a year ago and at the beginning of 1949. In other words, crude-oil supply exceeded demand in the first 8 months even though state regulation reduced domestic production substantially during that period."

It is particularly significant, said the committee, that stocks of all oils were reduced during July and August, whereas normally they increase during this season. This statement was interpreted as an implied prediction that industry activity will have to be increased substantially to cover winter peak consumption.

The accompanying table gives the demand and stock situation as compiled by the economics advisory committee.

In a separate report to the Compact Commission, the supply and demand committee of the Independent Petroleum Association of America severely criticized imports of crude oil and heavy fuel oil. This committee likewise dropped its former practice of making forecasts of the future.

Conservation Work Resulting In More Oil, Compact Is Told

ESTES PARK, Colo.—Reservoir control and secondary-recovery practices have increased the nation's petroleum reserves enormously and the possibilities of further increases are still great, it was declared in a series of reports to the Interstate Oil Compact Commission.

"As the life span of a man has been extended by medical research, so have the life spans of natural resources of oil and gas been extended by engineering research," declared Gov. Roy J. Turner of Oklahoma in addressing the commission.

Olin Culberson, member of the Texas Railroad Commission, declared that 70 per cent of the casing-head gas produced in Texas is now connected with a processing plant, and as a result of this type of conservation some 55,000 bbl. per day of liquid hydrocarbon materials is being recovered from gas which otherwise would have been wasted.

After describing the various types of conservation regulations used in Texas, Culberson said: "The next step in this direction, which is yet to be taken but is perhaps not too far away will be to require, from the beginning of the producing life of a new field, that reservoir pressure be maintained to the end that the greatest ultimate recovery of oil will be had even if this requires injection of gas or water in the reservoir during the early stage of operations."

Walker T. Pound, director of conservation of the Oklahoma Conservation Commission, described in detail the conservation practices in 10 fields in his state, and concluded: "The total of hydrocarbons saved in the 10 pools specifically referred to is in crude oil, 250,000,000 bbl.; in oil-field gas, 1,500,000,000,000 cu. ft.; in extracted liquids, 100,000,000 bbl. The enormity of the value of the gas and extracted liquids—since both of these would under wasteful methods be blown to the air—can best be appreciated when compared to other fuels. The gas and liquids alone that will be saved in these few fields are, for example, the equivalent in heat values to 333,000,000 bbl. of fuel oils, or 80,000,000 tons of anthracite coal."

A semifinal report was made by the joint stripper-well committee, which hopes to complete its assignment at the next meeting. In summarizing its survey of stripper wells, the committee stated:

"With 427,000 producing wells in the nation as of January 1, 1948, a total of 294,672 wells, or approximately 69 per cent, were classified as stripper wells. These wells produced in 1947, 279,659,199 bbl., or 14.9 per cent of the total of 1,879,000,000 bbl. produced in the nation. The average daily production for the stripper wells in 1947 was 2.6 bbl. while the average for all wells in the nation was 12 bbl. per day.

Stripper Wells Important

"The stripper-well oil was produced from 2,651,000 acres representing 48.5 per cent of the total productive acreage of the nation involving 22 oil-producing states. It is estimated that underlying these 2,651,000 acres the total reserves still possible to recover are 7,937,323,000 bbl. It is further estimated that 4,546,725,000 bbl. of these reserves can be produced only by the application of secondary-recovery methods.

"The total reserves which can possibly be recovered from stripper-well areas amount to slightly in excess of one-fourth of the present total estimated reserves in the nation."

Of considerable interest was the report of the secondary-recovery advisory committee, which has been working closely with the U. S. Bureau of Mines on research into many technical problems of increasing oil production. The committee asserted that research of this type gives far more promise of guaranteeing a future supply of liquid fuels for the nation than the proposal to build huge synthetic-fuels plants at government expense. The committee reported that it is advising the bureau on the most desirable and immediately useful research projects to be conducted under its present appropriation for secondary-recovery research.

A special paper on the possibilities of secondary recovery by mining oil sands was presented by Paul D. Torrey, chairman of the committee.

TOTAL DOMESTIC AND EXPORT DEMAND
(Thousands barrels daily)

	First 8 months		Change	
	1948	1949	Amount	Per cent
Gasoline	2,460	2,600	+140	+ 5.7
Kerosine	309	255	— 54	—17.5
Distillate fuel oil	978	890	— 88	— 9.0
Residual fuel oil	1,428	1,335	— 93	— 6.5
Others	945	870	— 75	— 7.9
Total demand	6,120	5,950	—170	— 2.8
Exports	378	355	— 23	— 6.1
Domestic demand	5,742	5,595	-147	— 2.6

PETROLEUM STOCKS
(Million barrels)

	Aug. 31, 1949	Change from Aug. 31, 1948	Change from Dec. 31, 1948
Crude oil	265.5	+33.5	+ 8.9
Products	365.5	+47.0	+16.4
All oils—United States	631.0	+80.5	+25.3
All oils—Pacific Coast	124.5	+31.4	+23.1
All oils—other United States	506.5	+49.1	+ 2.2

Clark Snubs New Attempt to Revive Mother Hubbard Suit

WASHINGTON.—Sen. Guy M. Gillette, Iowa Democrat, revealed to the Senate last week that he had made an attempt to revive the suit against the American Petroleum Institute, et al, and get the complaint amended to ask for divestiture of transportation and distribution facilities—but that he had failed.

This revelation came in a brief statement which the senator made in filing copies of an exchange of correspondence between himself and the Justice Department.

On April 13, Gillette wrote to Tom Clark, former attorney general and now a Justice of the U. S. Supreme Court. In that letter the senator reviewed the history of the case and commented that he had heard rumors that the suit was going to be dismissed.

"It is my feeling that the suit ought not to be dismissed but that vigorous effort should be made to proceed to bring the case to trial and, at the time, amend the pleading to seek judicial divestitute of the 22 major oil companies. I am very sure but for the imminence of war your predecessor in office would have included such a prayer for divestiture at the time of the filing of the suit," Gillette wrote Clark.

The reply which the senator received was dated May 2 and did not come from the former attorney general, but from Peyton Ford, acting assistant to the attorney general.

The senator's only explanation for the long delay in making the correspondence public was that he did not want to seem to be critical of Clark when he was under consideration by the Senate for confirmation as a Justice of the Supreme Court. However, there was no vacancy on the court at that time.

Too Unwieldy

Ford made the well-known rejoinder that "on reexamination after the war it was decided the suit was so large and unwieldly as to exclude any expedition and clear presentation of all the issues in a single law suit."

He stated that "segment suits" as in the case of the Standard Oil Co. of California and the Richfield Oil Co., were filed, that additional suits "at the distribution level are being prepared," that the grand jury in Los Angeles hearing evidence for over a year on pricing practices was about through with its investigation, and that "investigations in the refining and transportation branches are under way and may lead to the filing of additional suits."

In conclusion, Ford wrote that "Action on the American Petroleum Institute case is being held in abeyance pending the completion of the above investigations and decisions concerning the feasibility of segment suits and the likelihood of substantial elimination of restraints of trade in the petroleum industry as a result thereof."

Senator Gillette claimed that so far the Justice Department has covered only one of some 30 or more charges of violations listed in the 1940, original suit.

"In other words," observed Gillette, "it appears to be assumed that the boys will run to cover, and by the elimination of certain practices on which the original charges were based, they might, after nine years' delay, find it unnecessary to prosecute the suits on which they were instituted, because possibly the defendants may eliminate the practices complained of. It would seem from the attorney general's letter that they have filed two simple suits against two of the 22 defendants on the one question of exclusive dealing."

Imperial Increases Crude Receipts From Alberta

CALGARY, Alta.—Imperial Oil, Ltd., last week announced an increase in acceptances of crude oil from Redwater, Leduc-Woodbend, and Golden Spike fields of Alberta. The new market allowables, affecting Imperial and other companies selling to Imperial, became effective September 1.

Imperial's new acceptances are, in barrels daily: Redwater, 135; Leduc-Woodbend D3 zone, 115; D2 zone and Lower Cretaceous, 80; and Golden Spike, 325. Imperial's former market quota was: Redwater, 112½; Leduc Woodbend D3 zone 94½, D2 and Lower Cretaceous, 67½; and Golden Spike, 300.

British American Oil Co., other major crude buyer in the fields, early this week had made no statement regarding a change. Present British American quota is: Redwater, 100; Leduc-Woodbend D3 zone, 100; and D2 and Lower Cretaceous, 70.

Varied Program Planned at Dallas A.A.O.D.C. Meeting

A program highlighting topics of interest to the entire drilling industry has been prepared for the ninth annual meeting of American Association of Oilwell Drilling Contractors, which will be held in Dallas September 19-21.

Registration will open at the Baker Hotel September 19. Joseph S. Morris, of Allen & Morris, San Antonio, president of the association, will deliver the opening address at the first general session.

Included in the first afternoon session will be committee meetings on safety, accounting, rotary-drilling equipment and methods, and research.

Included on the program for September 20 will be: "The Balanced Rotary Rig," by C. A. Oberg, Standard Oil Co. of California, San Francisco; "Contractor's Response," by Ralph W. Marshall, Drilling & Exploration Co., Inc., Los Angeles; "Drilling Contract Forms," by W. C. Morris of Allen & Morris, San Antonio, and Hamilton Rogers, Rowan Drilling Co., Fort Worth; and "Operator's Response," by Earl A. Brown, Magnolia Petroleum Co., Dallas.

Wednesday's program will include the following papers: "Rig to Office Communications," by C. J. Paine, Paine Drilling Co., Dallas, and Jerry Stover, communications consultant, Dallas; "Diamond Core Bits," by R. J. McCloy, Stanolind Oil & Gas Co., Tulsa; "Hydraulic Power Transmitters," by Nicholas A. D'Arcy, Jr., Huntington Park, Calif.; and "Selection of Drill Stem," by Bruno Schabarum, Carl B. King Drilling Co., and Stanley Moore, Drill Collar Service Co., both of Midland, Tex.

Barnsdall, Ogden Reach Agreement on Merger

AGREEMENT on terms of a merger of Barnsdall Oil Co. and Ogden Corp., subsidiary of Atlas Corp., was announced last week by William Dewey Loucks, Barnsdall president, and Floyd B. Odlum, president of Atlas and chairman of Barnsdall.

Under the agreement the company would be known as Barnsdall Oil Co. and would retain as its officers and directors those of Barnsdall.

It provides that holders of common stock in Barnsdall would receive either the same number of shares of common stock in the new company or might convert each share into $55 par value 5 per cent cumulative preferred stock.

Atlas Corp., owner of about 80 per cent of Ogden Corp. common stock and 637,250 shares of Barnsdall stock, would take only common stock unless it should be necessary for it to convert into preferred stock in order to give the merged company a total of $20,000,000 par value of preferred stock.

A loan of $40,000,000 has been negotiated with Prudential Insurance Co. of America and a group of banks to provide funds for oil and gas exploration and development.

DeGolyer & MacNaughton estimated Barnsdall total proved reserves at 141,668,233 bbl. with an additional 41,302,000 bbl. classified as probable or possible.

Reliable reports indicated that Continental Oil Co. has dropped all negotiations for purchase of the Barnsdall Co.

International

WORLD-WIDE OIL DEVELOPMENTS

Burma Seeking Money to Buy Share in Private Oil Industry

THE Government of Burma is seeking to arrange financing which will allow it to acquire a substantial interest in the country's privately owned oil industry.

If the plan is carried out, the government will thus meet its obligations under a clause of the new Burma constitution providing that the development of natural resources must be either in the hands of the state or of corporations with a majority of Burmese capital.

The three British-owned oil companies involved have been attempting to rehabilitate their properties since the end of the war, but much of the work has been brought to a standstill by the prolonged Burmese civil disturbances. Some field installations have been captured by rebel forces and later retaken by government troops.

Prewar, Burma was one of the most important producing and refining areas in the Far East. Production was in excess of 21,000 bbl. daily from the central Burma fields, and its refineries had an aggregate capacity of more than 27,000 bbl. daily. The industry—fields and refineries—were almost completely destroyed in 1942 to deny them to the invading Japanese. Burmah Oil Co., Ltd., was the principal company with other operations carried on by Indo-Burma Petroleum Co., Ltd., and British Burma Petroleum Co., Ltd.

Largely because of the civil strife and the unsettled political conditions, Burma's production continues to be only a fraction of the prewar output. Last year it averaged slightly more than 800 bbl. daily, and Burmah Oil's efforts to reconstruct its 20,000-bbl. refinery at Syriam near Rangoon and the 325-mile pipe line from the fields were prevented by the insurrections.

Burma became an independent nation in January of last year, separating itself from Britain along with India and Pakistan. The constitution enacted by the Constituent Assembly made allowances for certain special exceptions to the provision against development of natural resources by foreign interests, and recent indications are that these restrictions may be further relaxed to permit the country to attract the capital it badly needs.

In Washington on a visit last month, U. E. Maung, Burmese foreign minister, issued a statement saying Burma had revised its policies so as to admit limited investment of foreign capital.

A clear statement of the present condition of the oil industry in Burma was given recently by Sir Kenneth B. Harper, chairman and joint managing director of Burmah Oil, at the company's annual meeting in Glasgow, Scotland.

He said the company questioned the government as to its intentions after the constitution went into effect. Satisfactory assurances were received informally but then the internal condition of the country began to deteriorate rapidly and so seriously that the company notified the prime minister it could not continue reconstruction until physical security was restored.

"The prime minister's reaction was prompt," the chairman said. "He invited us to put forward proposals for a scheme under which the Government of Burma would furnish the remaining capital required to complete reconstruction and thus acquire an interest for the state in the industry. By this means unemployment of a large number of workmen at an inconvenient time would be avoided, the industry would be restored, and incidentally government's obligations under the constitution with regard to state participation would be met. At the same time, such a scheme would protect our companies from putting up further capital during the next few years which will show whether or not the country is going to settle down and again become attractive to the investment of the foreign capital which it will continue to need for its development."

The Burmah Oil chairman said the company, along with Indo-Burma Petroleum and British Burma Petroleum proposed a plan which is still under discussion but near enough to acceptance, he said, for the Burmese Government to be seeking means to finance its share. He did not reveal its details.

"If the finance is not forthcoming, on the conditions which we have stipulated and regard as essential, the scheme will fall through and we shall then reduce our producing operations to, at best, the level required for local marketing. . . ."

Creole Cuts Operating Rigs; Output Unchanged

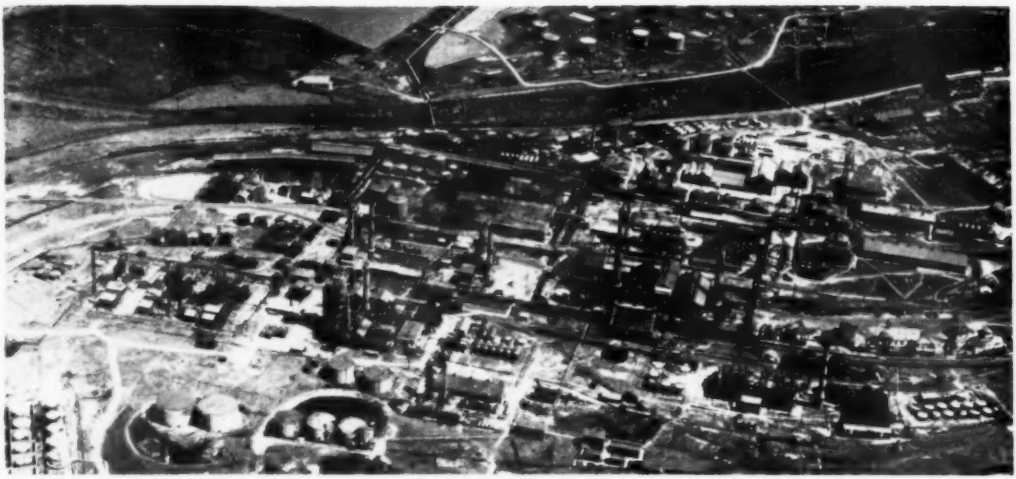
CREOLE PETROLEUM CORP.'S crude production in Venezuela showed little change in July from the previous month, but the average number of rigs operated by the company continued to decline.

The company's operated production in July averaged 585,462 bbl. daily. This compares to 588,591 bbl. daily in June. The operated production has been showing steady increases since it reached a low point of 475,919 bbl. daily in March.

In July, the average number of rigs operated by the company was 17.9. Rigs operating in June averaged 22.5. Through the last half of 1948, 31 or more rigs were being operated by the company. Reduced heavy-oil demand caused curtailment of some drilling plans.

Of Creole's July production, 437,516 bbl. daily was from the Lake Maracaibo region, 3,985 bbl. daily from Cumarebo, and 144,051 from eastern Venezuela. Refinery runs in July were 54,163 bbl. daily at Caripito and 17,815 at La Salina.

The company in July completed nine field wells and two exploration wells, all of which were producers.



This air view is of the Llandarcy refinery of National Oil Refineries, Ltd. (Anglo-Iranian) in South Wales. It is being expanded from a capacity of about 17,000 bbl. daily to more than 60,000 bbl. daily

Refining in the United Kingdom:

Huge Increase in Capacity Indicated

by F. Mackley*

International

UP to the beginning of the war no substantial attempt was made by the refining industry in the United Kingdom to meet the needs of the country in respect of major fuels derived from petroleum. By far the greatest proportions of such fuels of all types were readily available from refineries located near producing areas.

In general, therefore, the United Kingdom refining industry had developed on specialized lines to meet the specific requirement of the home market for certain types of petroleum products, notably asphaltic bitumens, lubricating oils, and petroleum solvents of narrow boiling range, although exceptionally, a few refineries imported crude oil and manufactured a full range of fuels and lubricants on a limited scale.

Development in high-grade lubricating-oil manufacture had resulted in the establishment of several types of solvent extraction plants, and in total a considerable proportion of the home requirements was being manufactured in United Kingdom refineries, from selected imported feedstock. Associated with lubricating-oil manufacture was the production of substantial amounts of wax and the production of large quantities of extract of aromatic and naphthenic character.

*Shell Refining & Marketing Co., Ltd., Cheshire, England. From a paper presented at the United Nations Scientific Conference on the Conservation and Utilization of Resources.

One of the preoccupations of the industry at this time was the upgrading of byproducts from refining operations to products of higher market value—a trend to be accelerated by the shortages and other circumstances of the impending war.

Wartime Developments

Although the war did not cause any great increase in the volume of United Kingdom refining, a great impetus was given to the maximum utilization of facilities and to the best utilization of all products of the refining processes. Research facilities were established or augmented, and some new processes were put into operation.

The pooling of resources on the distributing side of the industry was accompanied by a simplification and reduction in the number of grade products required, and this led to the more economic use of refinery equipment.

On the lubricating-oil side of the refining industry there was considerable emphasis on the manufacture of grades to Air Ministry specification and also on the refining of used aviation oils for reuse.

The recovery of naphthenic acids from certain refinery distillates was developed towards maximum yield of high-acid material.

New uses were found for the aromatic extracts from the solvent refining of lubricating oils, and, notably, certain fractions of these extracts were found to be very valuable as rubber extenders.

The shortage of vegetable and animal fats accelerated the usage of slack wax from the solvent dewaxing of lubricating oils as a source of olefins which could be converted into sodium alkyl sulfates having excellent properties of wetting power and detergency.

The process consists essentially of the vapor-phase cracking of slack wax to give the optimum yield of the desired olefins which are fractionated from the pressure distillate. The olefins are treated with strong sulfuric acid to form alkyl-sulfuric acids. Caustic soda is used as the neutralizing base, and the resultant solution of sodium alkyl-sulfate is extracted with a light petroleum fraction to remove unreacted hydrocarbons.

The most important wartime addition to United Kingdom refining capacity and experience was the erection and operation of plant and equipment at Heysham for the purpose of producing aviation gasoline.

Considerable experience of hydrogenation was already available from the hydrogenation of coal and creosote at Billingham, and the knowl-

edge available was freely drawn upon in developing a process for production of high-octane gasoline using a suitable imported naphthenic gas oil as feedstock for processing to butane and 100 O.N. base gasoline. The butane was used for the production of iso-octane.

Exploration for crude oil in Britain resulted in the development of Eakring field which reached a production of some 70,000 tons per annum. This crude yielded high-quality lubricating oil and wax distillates which were solvent extracted and dewaxed on an Edeleanu plant with subsequent acid and earth treatment.

The heavy residues were used to augment the feedstock requirements of a Duosol solvent extraction plant and an M.E.K. solvent dewaxing plant which were operating on imported residue for the production of high-grade aviation lubricating oil. The lubricating oils produced by Duosol extraction received final treatment with activated earth on a contact filter plant and were subsequently blended to meet aviation requirements.

Expansion Under Way

Although there has been marked development of the refining industry since the end of the war, particularly in the direction of developing chemicals from petroleum, the industry is currently dominated by the very considerable expansion of general refining facilities which is now taking place. This expansion has been activated by British government policy regarding United Kingdom refining.

The program envisaged entails construction of new refineries, extension of existing refineries, and adaptation of existing plant, and the general intention is that the capacity thus available will operate on crude from the Middle East.

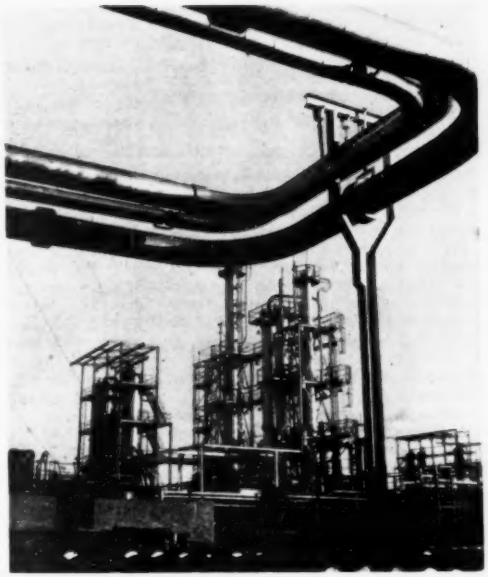
Activity has been directed first toward adapting and expanding plant but some new construction is already well under way or is shortly expected to commence.

The Heysham plant which was shut down in 1946 has been modified and is processing Middle East crude at 4,500 tons per day for the production of gasoline, gas oil, and fuel oil.

The Llandarcy refinery has been stepped up from 360,000 tons per annum to 850,000 tons per annum and should reach a capacity of 3,000,000 tons by end of 1949, and the Grangemouth refinery is being similarly increased from 360,000 tons to 1,500,000 tons per annum (one million tons per year equals about 20,000 bbl. daily).

Concurrently there is considerable development in production of petroleum chemicals and at least two of four plants under development are expected to be in production by mid-1949.

These plants will use imported gas oil as basic feed for cracking to olefins for subsequent processing to the objective end products but in one case it is planned to replace gas oil by high-olefin gas when an adjacent refinery is in operation.



These units are at the Shell organization's Stanlow refinery in Cheshire. Important chemical facilities are operated here as well as refining capacity

The products from the various chemical plants will include aliphatic alcohols and ketones, acetone (from which more complex alcohols and ketones will also be manufactured), glycols, aromatic hydrocarbons, high-boiling-point aromatic solvents and plastics.

The production of detergents is being considerably increased. The Shell plant at Stanlow has already been expanded to produce 50,000 tons per annum while plants for the production of other types of detergents have been developed by I.C.I., Monsanto and Anglo-Iranian.

On the lubricating-oil side of the refining industry maximum production of a full range of oils is being maintained. Plant capacities are progressively being improved by cutting maintenance off-stream times and by removal of bottlenecks. New uses have been found for byproducts of the refining processes, such as the naphtha-sulfonic soaps derived from clean sludges resulting from the refining of certain white oils.

All well-established processes have been thoroughly looked over to insure maximum efficiency in the production of an ever-growing variety of primary and secondary grades, and there is a continuous review of operations in an endeavor to satisfy each new need.

Future Trends

So far as refinery capacity is concerned the future trends of the United Kingdom refining industry are fairly clearly indicated. It appears quite definite that projected expansion will lift capacity from the prewar level of about 4.5 million tons to approximately 20 million tons by about 1953. It is likely that if projects not included in the British Government's plans are developed, a further addition of 8 million tons capacity may be expected. In any case it appears that crude oil refineries now under construction will be capable of easy expansion should the need arise. It is estimated that United Kingdom requirements of petroleum products for 1948-49 will be in the region of 18 million tons, and it may well be that home demand will rise to about 22 million tons by 1953.

There seems to be no doubt that by implementation of the current program, the United Kingdom will be substantially self-supporting in petroleum refinery capacity.

It seems clear also that the new refinery development is to be of the most flexible character possible and that the proposed plants will be able to meet all commercial and military needs, with a large degree of freedom to switch in quantity and quality of products.

Arising from the operation of these refineries, there will be available a large potential of refinery gas with appreciable olefin content and in at least one case it is proposed to feed high-olefin content gas to an adjacent plant for the manufacture of aliphatic alcohols and ketones. It seems likely that availability of such gas at other locations will encourage the further development of petroleum chemicals, for the production of which, pyrolysis of suitable distillates must be the starting point for the time being.

It is also probable that there will be a corresponding development towards the sale of the saturated hy-

drocarbons, propane and butane, as "liquid gas," and in certain instances it may prove profitable to pipe methane for admixture with town gas.

A probable alternative outlet for some of the low-molecular-weight saturated hydrocarbons is the production of carbon black.

The necessity to remove sulfur from certain of the fractions resulting from refining of Middle East crude is likely to result in the production of elemental sulfur or sulfur compounds.

On the petroleum chemical side of refining operations indications are that there is likely to be great activity during the next few years, both as regards erection of new plant, and the development of new processes. It is likely that there will be early development towards halogenated hydrocarbons, in which case it is probable that there will be concurrent development of tetraethyl lead manufacture. So far as detergents are concerned, it is certain that there will be continuance of intense study and development for several years, and that the results of these efforts will progressively provide relief in the world shortage of vegetable and animal fats. The use of synthetic detergents from petroleum is firmly established in the textile and other industries, and a substantial entry has already been made into the domestic market.

In agricultural and horticultural matters, there is an increasing interest in the use of sprays to combat various pests, and also in soil fumigants. These are largely derived from petroleum, and although total sales are small in volume, their anticipated more extensive use is likely to show significant results in increased productivity of the land.

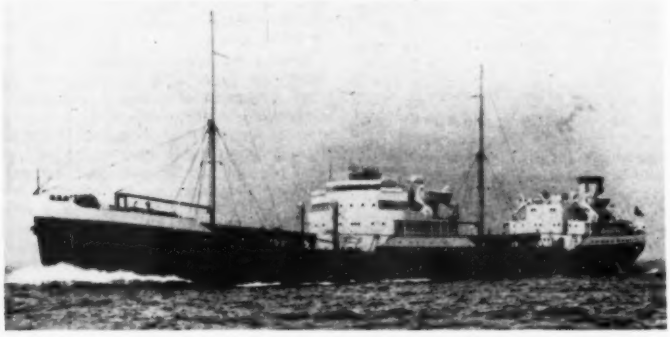
Research, which is now a weighty item in petroleum expenditure, is being extended into all new fields of operation—aircraft fuels including jet fuels, motor and diesel fuels, petroleum chemicals, lubricants and bitumens. There can be no doubt that within the next 10 years, probably within 5 years, the United Kingdom refining industry will be very firmly established on the basis of supplying all home requirements, and of exploring all possible outlets for new products from petroleum. Though the creation of the refining industry in the United Kingdom is basically for the supply of the home market, it is possible that an export trade will be developed in specialized types of products such as lubricants and chemicals.

Shell Plans Bulk Shipment of Asphalt

SHELL PETROLEUM CO., LTD., London, England, has completed plans for the bulk shipment of asphalt from Curacao, D.W.I., to European markets. The company has converted three 9,000 d.w.t. tankers—the Lembulus, the Labiosa, and the Liparus—to the transportation of the asphalt from the Curacao refinery to bulk terminals which have already been completed at Copenhagen, Denmark, and Setubal, Portugal.

The tankers are fitted with coils so that the asphalt can be delivered "hot" at the point of delivery. Each tanker has a capacity of 34,000 bbl. of asphalt. The asphalt tanks are located in the center of the ships and in addition to the coils are fitted with jacketed lines and pumps. The balance of the cargo consists of black oils carried in the wing tanks. The conversion cost for each was $120,000. The terminals in Denmark and Portugal each have a capacity of 50,000 bbl. The shipments will consist of two basic grades and will be manufactured into the several products required by European markets.

In the past in Europe shipment of asphalt has been confined to carriers of small capacity. The bulk shipments from Curacao will not replace these smaller shipments but will supplement them and provide additional supplies for the rapidly expanding market for asphalt in Europe. It is estimated that about 60 per cent of western Europe's total asphalt demand can be supplied in these bulk shipments. The Shell interests have a similar service between Curacao and the United States.



The 9,110-ton Labiosa, one of the ships converted by Shell to asphalt service. Center tanks were fitted with heating coils to maintain asphalt at pumping temperature

International

ECA Approves Work on Three French Refineries

Projects to rehabilitate and modernize three refineries in France have been approved by the Economic Cooperation Administration.

Cost of the projects is estimated at $20,435,000.

One project calls for rehabilitation and expansion of the Donges refinery at St. Nazaire owned by Raffineries Francaises de Petrole de L'Atlantique. It was heavily damaged during the war.

A second project calls for the installation of lubricating-oil equipment at the Gonfreville refinery, and the third provides for alterations on a cracking unit at the La Mede refinery near Marseille. Both of these are owned by Cie. Francaise de Raffinage.

Colombia Unveils Bust Of Pipe-Line Planner

Col. James W. Flanagan, who is given major credit for the construction of the 335-mile De Mares-Cartagena pipe line in Colombia, was honored recently at Cartagena when his bust was unveiled on the grounds of the Hotel Caribe.

Colombian leaders in speeches paid tribute to Flanagan's efforts in behalf of the progress of Colombia. Naval School cadets and Colombian marines paraded before the crowd at the ceremony.

Flanagan, who was with the Standard Oil Co. (N. J.) organization in Mexico, went to Colombia for the company and in 1923 negotiated the original concession for the pipe line. He served as president of Andian National Corp., Ltd., affiliated with International Petroleum Co., Ltd., until his retirement about 3 years ago. The pipe line was completed in 1926 and gave De Mares, Colombia's major producing area, an outlet to world markets. Flanagan later acquired real estate in Cartagena and promoted the development of a district in the city.

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...More Highlights of the UN Meeting

Presented here are highlight excerpts from important oil papers presented at the United Nations Scientific Conference on the Conservation and Utilization of Resources, held in Lake Success, N. Y., August 17-September 6. A news story covering other papers presented at the conference was published in September 1 issue of The Journal on pages 22 and 23.

Offshore Drilling

"... The continental shelves of the world cover 11,800,000 sq. miles, roughly one-twelfth of all ocean areas. W. E. Pratt estimates the volume of possible oil bearing sediments there present to be 30 million cubic miles, and by comparison with the volume of such sediments already explored in the United States, the oil deposits in place on the world continental shelves might be ten times the 53-billion-barrel reserve developed in that country, or a total of over one-half trillion barrels.

M. H. PARKS

"Attempts to reduce discoverable deposits to recoverable reserves have begun off the coasts of Louisiana and Texas in water as deep as 60 ft. and although experience has been limited by time . . . success appears to depend upon reduction of presently indicated costs, maintenance of a market price high enough to support extraordinarily high costs, and ability of operators to secure properties of a sufficient size and on terms allowing efficient operation.

"The chief physical problems, drilling site preparation and transportation, arise from wind, waves, and currents, and become more difficult and expensive to solve as water depths and distances from shore and operating bases increase."

Mercer H. Parks, Humble Oil & Refining Co., Houston. (From paper "Petroleum Production from Continental Shelves.")

Reservoir Control

". . . The important techniques bearing on conservation of production . . . evolved in Iranian fields . . . have been in operation long enough to stand the test of time. . . . The Masjid-i-Sulaiman field, for example, during the 38 years it has been on production, has yielded over 800 million barrels and is still producing 70,000 bbl. per day without pumping equipment, gas compression plants to lift the crude, or water separation plant. . . .

"Over 98 per cent of Anglo-Iranian Oil Co.'s total production of 2 billion barrels plus has been from limestone reservoirs, and from fields operated under 'unit control.' . . . The economic importance of three factors in the evolution of operating techniques in the Iranian limestone fields is emphasized . . . these being freedom of reservoir connection as a result of fissuring, unified control of natural producing units, and provision of facilities for scientific investigation. . . . Important techniques are: (1) The development of oil fields with the minimum number of wells; (2) control of production distribution and of movements of gas-oil and oil-water interfaces in reservoirs, to prevent production of any free gas or water and to conserve reservoir energy; (3) Multistage gas separation for gasoline retention in lieu of treatment plants and estimation of forward flowing pressures from energy considerations; (4) recycling of temporarily surplus residue to reservoirs, to increase refinery flexibility and to recover valuable light fractions of reservoir crude which would otherwise be left behind in gas domes."

D. Comins, M.C., M.A.I.M.E., F.Inst. Pet., Anglo-Iranian Oil Co., Ltd., London. (From paper "Conservation in Production.")

Geochemistry and Biochemistry?

". . . . At the present time there is no certain method of detecting the existence of oil or gas deposits from a distance. If such a method existed, it would definitely replace all the other techniques now in use. It was hoped to achieve that aim by the systematic study of micro-indices or geochemistry (analysis of the hydrocarbon content of the soil near the surface) and by biochemical methods which may be summed up as the use, as a reagent, of various living species. But the results are still extremely uncertain.

"Is it possible to hope for progress in the near future in the immense undertaking of oil discovery? The answer is a bold 'yes,' though not because of new tools: unless the unexpected happens, the only thing to be expected now are improvements in technique, which would have more effect on the cost than on the results. On the contrary, much progress is still possible in the mastery of all the numerous tools which are now available for oil exploration, in the coordinated use of those tools and in the synthesis of information."

M. L. Migaux, director general, Compagnie Generale de Geophysique, Paris. (From paper "Techniques of Oil and Natural Gas Prospecting.")

Secondary Recovery

". . . . The secondary oil reserves of the United States are estimated currently to be in excess of 7 billion barrels, but I am willing to venture the guess that the physically recoverable secondary oil reserve of the nation may be as much as twice this figure. . . .

PAUL D. TORREY

"The two earliest water floods in North Texas have had an over-all development and operating expense, adjusted to prices prevailing during the early part of 1948, of $1.40 and $1.47 per barrel respectively. Similarly adjusted average costs, which include land cost or over-riding royalty, on 17 water-flooding operations in Oklahoma are $1.55 per barrel, and on 16 water-flooding operations in Kansas are $1.32 per barrel. These figures do not include any allowance for interest on the investment or for federal taxes. . . .

"In Pennsylvania, about 80 per cent of the current oil production comes from secondary recovery operations. . . . In Illinois, information obtained from 128 secondary projects indicates that oil recovery can be increased by about 370 million barrels. . . . Approximately 140 million barrels of oil have been produced by the application of secondary methods in Oklahoma. . . . In Texas, it has been estimated that the water injection program in the East Texas field will result in an increased recovery of more than 600 million barrels of oil. . . . Recent studies by the Arkansas Oil and Gas Commission have shown that the secondary reserves of Arkansas, which include all additional oil that may be obtained by the injection of gas or water, are almost equal to the existing proved primary reserve. . . ."

Paul D. Torrey, president, Lynes, Inc., Houston. (From paper "New Techniques for Increasing Production of Oil and Gas.")

Truman Says U.S. Will Reopen Loan Discussions With Mexico

WASHINGTON. — President Truman's firm announcement, at his press conference September 1, that the United States would reopen negotiations with Mexico for an oil loan, had a build up in Capitol Hill statements.

Just as the Senate was preparing to quit for a week's holiday over Labor Day, Rep. Charles A. Wolverton of New Jersey, ranking Republican member of the interstate commerce committee, announced that on September 21, he would introduce a resolution calling for an investigation into "the inept and shameful handling of Mexican oil policy by the state department." The House resumes its sittings September 21.

Sen. Dennis Chavez, New Mexico Democrat, made a radio talk August 30, arguing the advantages of an American loan to develop Mexican oil.

Wolverton asserted that through State Department officials connected with law firms prosecuting claims against Mexico, these firms have been pressing the department to act as a collection agency.

"The Mexican government has recently shown that it is ready and willing to have American capital engage in all industrial activities, including the production of oil," declared the New Jersey congressman. "The culmination of an agreement with various American oil interests is conclusive proof of this fact," he said.

Needed for War

Mexican oil, said Senator Chavez, would be very important to the United States in case of a war. He chided this country for developing Arabian oil, "easily accessible to the armies of our only potential enemy, when we have a potential reserve accessible by land in Mexico."

He declared that reasons for that policy should be brought into the open.

"The American people must be told the shameful story how the big oil companies whose properties were expropriated in 1938 are unduly influencing the State department by not permitting a loan which would put the petroleum industry in Mexico on its feet. The machinations of the big oil companies present one of the most sordid features in the history of American relations with Mexico, and they represent a threat to our national security for they are thereby arming the Communists with a powerful propaganda weapon."

Earlier it had been indicated that if the oil-loan talks were resumed it would be at the suggestion of United States authorities.

In New York, Sen. Antonio J. Bermudez, head of Petroleos Mexicanos, was quoted by Dr. Samuel Guy Inman, specialist on Latin American affairs, as saying: "As far as we are concerned, negotiations for an oil loan from the United States are over."

California Heavy Fuel, Crude Prices Reduced

LOS ANGELES.—A cut in the price of heavy fuel oil and a corresponding reduction in the price offered for low-gravity crude were announced last week in California.

Union Oil Co. of California and Standard Oil Co. of California announced cuts of 35 cents per barrel for heavy fuel, bringing the product down to $1.25 per barrel. Richfield Oil Corp. announced a reduction of 15 cents to $1.45.

Standard announced the crude-oil price cut, dropping 25 -gravity oil 3 cents per barrel and ranging to a cut of 35 cents for oil of 14 gravity or heavier.

Standard's price changes were effective September 3 and those of Richfield and Union September 1.

Union has contracted for the delivery of between 3,000,000 and 4,000,000 bbl. of heavy fuel on the East Coast this winter at a reported price of $1.60. With transportation charges of about 70 cents, the company would net about 90 cents per barrel.

300 Chemical Engineers Expected at Meeting

HOUSTON.—More than 300 engineers from Texas' chemical and petroleum - refining industries are expected to attend the fourth annual meeting of the South Texas Section of the American Institute of Chemical Engineers.

The meeting will be held October 21 in the Hotel Galvez, Galveston.

Oil papers to be presented include: "Industrial Fractionating Tower Packing," R. C. Scofield, Pan American Refining Corp.; "Combating Corrosion in a Chemical Plant with Magnesium Anodes," O. Osborn, Dow Chemical Co.; "Calculations of Minimum Reflux Ratio for Multicomponent Distillation," J. A. May, Dow Chemical Co.; and "Thermal Cracking Plant Capacity as Affected by Pressure and by Feed Stock Composition," Judson S. Swearingen, Southwest Research Institute.

Third World Petroleum Congress Is Planned

The third World Petroleum Congress is scheduled to be held in the Netherlands in the spring of 1951. The first such congress was held in London in 1933 and the second in Paris in 1937.

Purpose of the congress is to provide an opportunity for the discussion of all technical subjects pertaining to the petroleum industry.

Deep Hole Proves Dry

The world's deepest hole, Superior Oil Co.'s Pacific Creek test in Wyoming, was abandoned last week as dry. Total depth was 20,521 ft.

Next Week

Special instrumentation section.—In this forthcoming issue of The Oil and Gas Journal will appear, in conjunction with the fourth annual meeting of the Instrument Society of America, St. Louis, September 12-16, a number of informative papers on advanced instrumentation practices and equipment. Included will be an authoritative discussion and picturization of a standardized system of instrumentation symbols and identification.

Cost of synthetic fuels.—Dr. George Roberts, Jr., and Paul R. Schultz of Stanolind Oil & Gas Co. research laboratories, present carefully computed cost figures for production of liquid fuels from natural gas, crude oils, oil shale, and coal.

Corrosion control.—Report of a 3-year experience with a variety of corrosion inhibitors and protective methods for West Tuleta field is given by Edward N. Jones, consulting engineer, Pettus, Tex.

Viscosity-temperature charts.—Article presents a number of very useful charts and tables, for manufacture and use of lubricating oils. Author George C. Donovan is senior research engineer, Tide Water Associated Oil Co., San Francisco.

Distillation conversion chart.—P. L. Latour, research laboratories, The Texas Co., Beacon, N. Y., gives system for placing distillation tests on "evaporated" basis.

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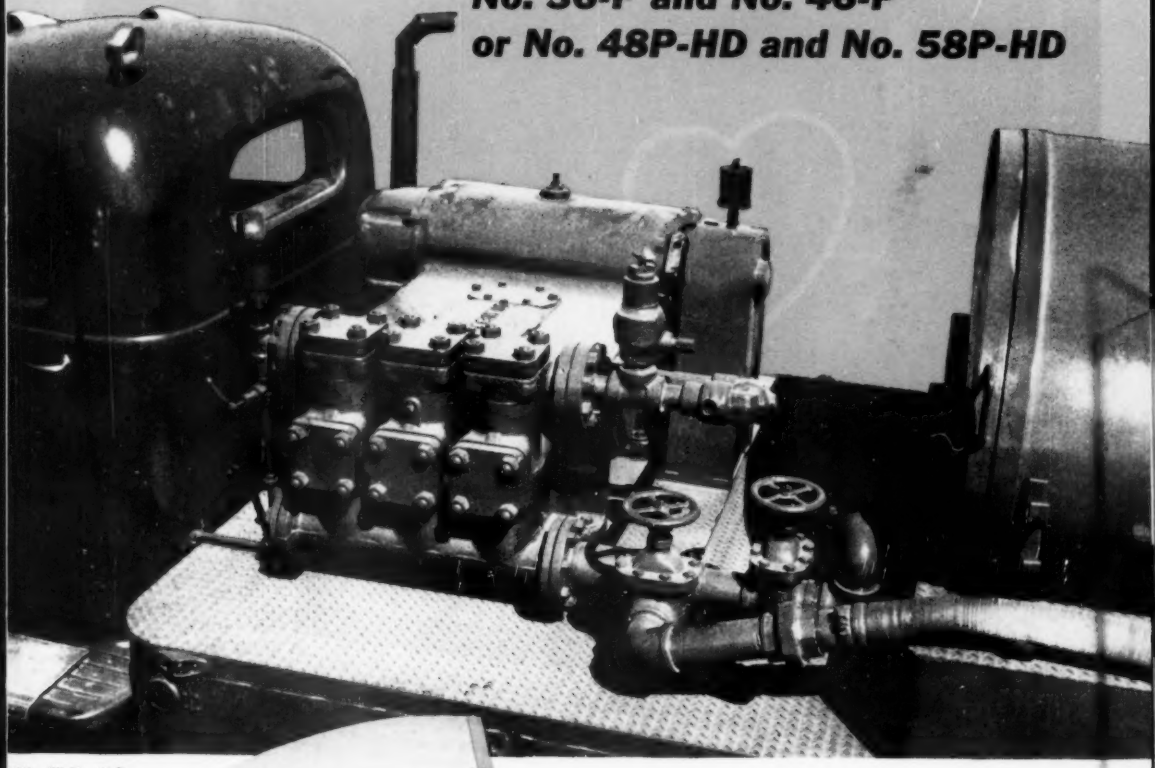

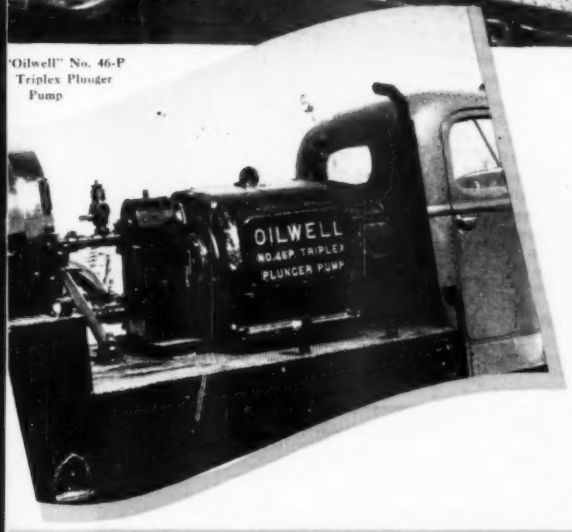

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Martin Is a Veteran of Refinery Construction

FOR the past 2 years, A. M. Martin as superintendent of The Texas Co.'s Eagle Point Works has supervised the construction of a complete new 40,000-bbl. per day refinery. When the company's first major eastern refinery goes on stream later this year he will continue to head its operation.

Born in Waco, Tex., in 1899, he attended grade and high schools in Arizona and Texas and later studied at Texas A. & M. College and Massachusetts Institute of Technology. Following service as a Marine flyer in World War I he entered the oil industry as a driller and later became a drilling contractor in Texas and Louisiana.

He joined The Texas Co. in 1926 as construction engineer at the Port Arthur refinery and following the extensive 4-year expansion program, was named supervisor of construction and maintenance in 1930. From 1931 to 1933 he served the subsidiary Texaco Salt Products Co. at Tulsa as manager and vice president and returned to the parent company as assistant to the vice president and general manager in charge of refining, in the New York offices.

In December 1939 Martin was named assistant superintendent of the Lawrenceville, Ill., refinery, later becoming superintendent. Later, as superintendent of the Lockport, Ill., refinery he supervised a 2-year wartime expansion program in 1942 and 1943.

In February 1944 he was elected vice president of Arabian American Oil Co., with offices in San Francisco, and served both in this country and in the Middle East. When The Texas Co. determined to build its Eagle Point plant in New Jersey he returned to take charge of the new plant and was named superintendent on October 1, 1947.

J. J. Arps, formerly chief engineer and assistant general superintendent of British - American Oil Producing Co., Tulsa, has been named to the newly created position of manager of production research and economics. A graduate of Technical University, Delft, Holland, Arps obtained his masters degree in mining engineering and geology in 1932. He formerly was with Shell Oil Co. before joining British-American in 1940 as district engineer for the Gulf Coast area.

Sam C. Scheuber, district engineer for the Big Lake, West Texas district, Amerada Petroleum Corp., has resigned and is now an independent consulting engineer. He is headquartered in San Angelo, Tex.

John W. Evans, foreman for Williams Brothers Corp., has been transferred to Port Jervis, N. Y. He formerly served in the Venezuelan district.

W. A. Sinsheimer, Jr., formerly with **Raymond F. Kravis,** Tulsa, as a petroleum engineer, has joined the firm of DeGolyer & MacNaughton at Dallas in the same capacity.

Howard Zellers, owner of Z. P. Drilling Co., has transferred from Bakersfield, Calif., to Maricopa, Calif.

Thomas B. Smith, II, formerly petroleum engineer with Stanolind Oil & Gas Co. at Brownsfield, Tex., is now assistant superintendent for Eastern Engineering Co., Atlantic City, N. J.

Ervin G. Kroker, manager of drilling operations for Kroker Drilling Co., has been transferred from Cumas Valley, Ore., to Roseburg, Ore. He formerly served as tool pusher.

F. L. Lichtenfels, formerly chief chemist at the Toledo refinery of Standard Oil Co. (Ohio), has been named chief refinery - control engineer. He is succeeded by **J. V. Boysen** as acting chief chemist in charge of the refinery laboratory.

J. J. Stadtherr, formerly supervisor of training at Pure Oil Co.'s Heath refinery, has been transferred to Chicago as training director of the company's refining division.

Kenneth R. Joynt, assistant foreman for Magnolia Petroleum Co. has been named production foreman, in the company's Falfurrias, Tex., district. Other producing division changes include: **Garland C. Rutherford,** transferred from the petroleum-engineering department, Falfurrias, to the producing department there, as assistant production foreman; **Harold Brewer,** production foreman in the Freer area, Alice, Tex., district, transferred to the Brownfield, Tex., district as production foreman for the Scurry County area; **B. J. Sasser,** production foreman at Salem, Ill., transferred to Luling, Tex.

E. H. Powers, geologist for Gulf Oil Corp., Fort Worth, has been transferred to Houston, succeeding **B. G. Martin,** who has been named assistant to the vice president of production.

James E. Cochrane, chemical engineer recently with Deep Rock Oil Corp. at the Cushing, Okla., refinery, has joined Tide Water Associated Oil Co. in that capacity at the company's Drumright, Okla., refinery. The firm also announced that **Lee C. Sharrai,** chemical engineer, has been transferred from cycling operations at Palestine, Tex., to the gas-utilization section at Kilgore, Tex.

J. A. HUITT

Joe A. Huitt, assistant to the vice president of production for Deep Rock Oil Corp., Tulsa, has been appointed manager of the company's producing department, replacing **Robert G. Martin,** who will retire in October. Huitt joined Deep Rock as a roustabout, and has been with the firm 20 years. He has served as assistant to the manager of supplies and economics division, **J. G. Campbell,** since May of this year.

Edward C. Borrego, president and managing director of Societa Petrolifera Italiana, subsidiary of Standard Oil Co. (N. J.), has been in the United States on leave and on business matters since June. During August he visited points in the southwest. He expects to leave New York on September 23 to return to Italy.

Robert V. Payne, geophysical party manager, and **R. James Wilkerson,** driller, Shell Oil Co., Inc., Bakersfield, Calif., have been transferred to the Long Beach district. **Laurence C.**

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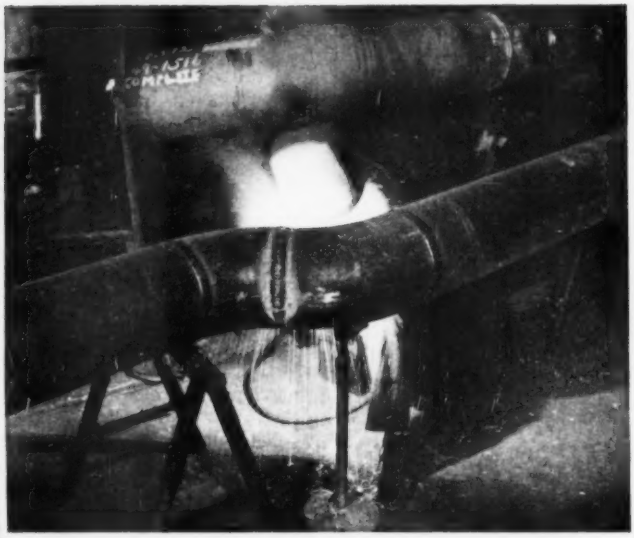

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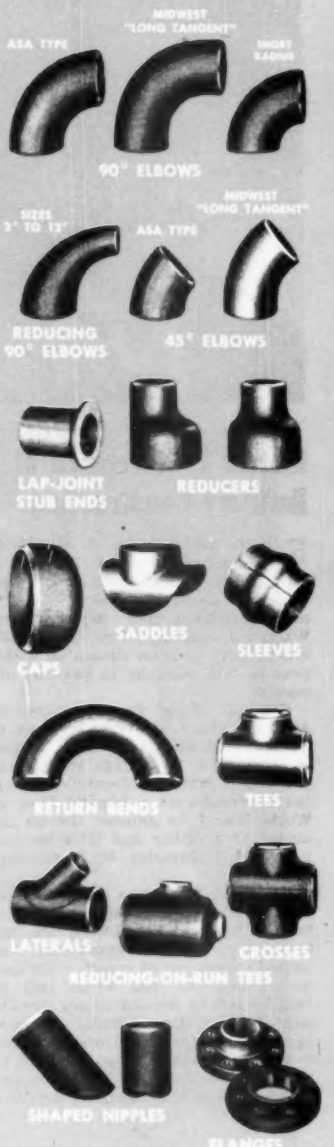

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Beck, driller at Bakersfield, has been transferred to Ventura in the same capacity.

Dr. W. A. Bruce and **Dr. E. M. McNatt** have been appointed assistant chiefs of research for Carter Oil Co., Tulsa, and **Dr. M. W. Kriegel,** scientist for the company, has been named head of exploitation research, replacing Bruce. **Dr. R. R. Thompson,** New York City, senior geophysicist with Standard Oil Development Co., has been appointed head of geophysical research, replacing McNatt. Dr. Bruce has been with Carter since 1938; Dr. McNatt joined the firm in 1939; and Dr. Kriegel has been on the Carter laboratory staff since 1940. Dr. Thompson has been on the production-research staff of Standard Oil Development Co. for the past 3 years. **Dr. P. A. Dickey** continues as head of geological research and **F. G. Boucher** as head of development engineering. **Dr. P. S. Williams** is research chief, and **Dr. R. N. Meinert** is associate research chief.

DR. W. A. BRUCE

Bernard C. Ryan, assistant head of operations analysis at Esso Standard Oil Co.'s Bayonne, N. J., refinery, has been named section head in charge of distillation, cracking, heat exchange, and combustion at the company's Bayway refinery, Linden, N. J. He has been replaced by **Wilbur V. Hunt** at the Bayonne plant, who formerly was head of the group which follows distillation and asphalt operations. **Robert E. Meskill,** engineer in the operations analysis department at the Bayonne plant, has been named to replace Hunt.

J. William Austin, petroleum engineer, Stanolind Oil & Gas Co., has been transferred from the Houston division to the Hasting area office. **Sam Bounds,** petroleum engineer, has been transferred from the Houston division office to the South Houston area office.

John W. Harrison, geologist for Argo Oil Corp., working out of the San Antonio office, has been transferred to the geological office in Casper, Wyo. **M. T. Rathvon,** who has been with Argo and its predecessor companies for more than 30 years, is retiring as vice president and general superintendent of the company, and the position of general superintendent will be taken over by **R. R. Ullstrom.** He will be headquartered in Denver.

Glenn H. McCarthy, Houston, has been appointed to the board of regents of Lamar State College of Technology by Governor Allan Shivers. Others appointed to the board are: **Clark Barrett,** assistant manager of the E. I. du Pont de Nemours Co., Inc., plant, Orange, Tex.; **A. P. Beutel,** vice president, Dow Chemical Co., Freeport; **Joseph Mares,** of Breckenridge, vice president, Monsanto Chemical Co., Texas City; and **Lester Clark,** oil operator and former state representative.

J. T. Gist, division geologist for West Texas and New Mexico, Pacific Western Oil Corp., Midland, Tex., has been transferred to Los Angeles, where he will serve as regional geologist for the Rocky Mountain and Canadian areas.

C. H. Hesser, petroleum engineer for Stanolind Oil & Gas Co. in the Pine Island area of northwestern Louisiana, has joined Continental Oil Co. as a petroleum engineer at Lance Creek, Wyo.

George Vorbe, chairman of the department of geology and advisor to the department of petroleum engineering, New Mexico School of Mines, Socorro, has joined the firm of D. D. Feldman Oil & Gas, Dallas, as chief geologist. He formerly served as district geologist for Texas Pacific Coal & Oil Co., and assistant district geologist for Stanolind Oil & Gas Co.

Miller W. Conn, manager of the Perco division, Phillips Petroleum Co., Bartlesville, Okla., has been appointed to the position of assistant manager of the chemicals-products department of the company, and will be in charge of the Perco, special products, and drilling-specialties division. Succeeding Conn as Perco division manager is **Dale Fischbeck,** formerly service engineer of the division for the past 2 years. Conn joined Phillips in 1936, and Fischbeck joined the firm in 1946. The Perco division handles licensing on Phillips processes.

M. W. CONN

Kenneth L. Smith, petroleum-production engineer for Stanolind Oil & Gas Co. at Ellinwood, Kans., has been transferred to Levelland, Tex.

Henderson Coquat, president and general manager of Longhorn Drilling Co., has been elected chairman of the San Antonio chapter of American Association of Oilwell Drilling Contractors. Other officers include: **Dan L. Clark,** Clark Drilling Co., Corpus Christi, vice chairman; and **Marvin W. Rogers,** Allen & Morris, secretary.

Glen Patrick has been appointed district geologist at San Antonio for American Republics Corp. He was formerly with Trans-Western Royalty Co., San Antonio, and prior to that time served 10 years with Stanolind Oil and Gas Co.

A. J. Welborn, formerly with Gulf Oil Corp. in Houston for 15 years, has resigned and entered the independent producing business. He will concentrate in the West Texas-New Mexico area, with headquarters at Lubbock, Tex. Welborn has served with various major companies, both in the United States and in South America. He served for 3 years with Petroleum Administration for War in Washington, D. C., during World War II, and was given an award of merit in recognition of his services.

H. H. Arnold, Jr., has been appointed manager of exploration for McColl-Frontenac Oil Co. and Texaco Exploration Co. Arnold formerly was in Denver where he served as manager of the Rocky Mountain division of The Texas Co. A geologist and petroleum engineer for The Texas Co. for 23 years, Arnold still retains his Rocky Mountain title in addition to assuming new duties in Calgary.

Clark Lloyd, chief engineer for Texas Railroad Commission's oil and gas division, will resign effective September 15. He joined the commission in 1932 as a member of the engineering staff, and became chief engineer last December when **Jack Baumel** was given a leave of absence to work in Venezuela. Baumel will rejoin the commission in January.

J. L. Cramer, Stanolind Oil & Gas Co., has been placed in charge of a newly opened land and geological office of the company at Billings, Mont., from which activities for Montana and the Dakota will be directed.

John B. Rosen, Stanolind Oil & Gas Co., North Texas-New Mexico division, has been named district engineer for the Lubbock, Tex., district, and **George L. Ellis** has been named senior geologist at the Fort Worth division office. Ellis will direct geophysical and geological coordination,

PERSONALS

and replaces **F. H. Schouten,** who has been transferred to the Canadian division. Rosen joined the company in 1934 and formerly was a petroleum engineer supervisor at Tulsa. Ellis joined the firm as geologist in 1945.

Lawrence A. Bebeau, head well puller at Oilfields, Calif., for Shell Oil Co., Inc., has been transferred to Bakersfield, Calif., in the same capacity. Other changes in the production department, West Coast area, include: **Eldo B. Croson,** head well puller at Bakersfield, named rotary driller in that area; **Lemuel E. Glines,** rotary driller at Oilfields, transferred to Ventura; and **Harry Iverson,** rotary driller at Oilfields, transferred to the Ventura area.

Milton S. Housner, Shell Oil Co., Inc., formerly assistant to the traffic manager at San Francisco, has succeeded **R. T. Potts,** recently retired, as assistant traffice manager at Los Angeles.

David W. Sellery, formerly division land man for Ohio Oil Co. at Los Angeles, has been named division land man as Casper, Wyo., succeeding **D. J. Griffin,** who recently was named district manager of the company's office in Calgary, Alta., Canada. **Paul S. Geiger** replaces Sellery at Los Angeles.

E. Nelson Frost, Allied Oil Co., Inc., Cleveland, has been appointed traffic manager for the company. He formerly served as assistant manager of the traffic department.

A. Dee Simpson, vice chairman of the board, National Bank of Commerce, Houston, was recently elected to the board of directors of Tennessee Gas Transmission Co.

James T. Rasbury, formerly director of industrial relations for Western Petroleum Refiners Association and Sunray Oil Corp., is now industrial relations supervisor for Sinclair Oil & Gas Co., Tulsa.

Frederick H. Connally, treasurer and assistant to the secretary of General American Oil Co. of Texas, Dallas, recently was elected to membership in the Controllers Institute of America. Others elected include: **Richard J. Conners,** auditor and assistant secretary of W. C. McBride, Inc., and **Ben Roshton,** secretary-treasurer, Kirby Petroleum Co., both of Houston.

SHIFTS —

W. K. Arbuckle, engineer, British American Oil Producing Co., Houston to Taft, Tex.; **V. P. Cantwell,** engineer, Pan American Production Co., Houston to Pine Prairie, La.; **W. F. Tipton,** superintendent, Montex Drilling Co., Levelland to Brownfield, Tex.

E. D. Grimes, superintendent, Ray & Harris Drilling Co., San Angelo to Robert Lee, Tex.; **N. T. Johnson,** superintendent, Circle Drilling Co., Eunice to Alexandria, La.; **S. A. Bloch,** engineer, Haynesville Operators Committee, Haynesville, La., to Tulsa; **P. L. Boatner, Jr.,** geologist, Carter Oil Co., Shreveport, La., to Lander, Wyo.; **D. B. Rumsey,** foreman, C. H. Murphy & Co., El Dorado, Ark., to Homer, La.; **Paul H. Miller,** refinery engineer, Pana Refining Co., Canton, Ill., to Chino, Calif.; **Harold G. Cramer,** engineer, Texas Empire Pipe Line Co., Cooksville to Vandalia, Ill.; **Otto Wendenburg,** geologist, Gulf Research & Development Co., Laurel, Miss., to Alexandria, La.; **David L. Welsh,** geologist, Carter Oil Co., Manhattan to Council Grove, Kans.; **J. D. Milliken,** engineer, The Texas Co., Cody to Worland, Wyo.; **C. W. Becker,** Midwest Exploration Co., Lander, Wyo., to Wetaskiwin, Alta., Canada; **Loyd Somers,** The Texas Co., Marlow to Seminole, Okla.; **Bradley Skinner,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Denver; **Harold M. Hawkins,** engineer, Pan American Production Co., Norman, Okla., to Rogers, Ark.; **Spencer H. Rockwood,** superintendent, Shell Oil Co., Oklahoma City to Houston.

James M. Gaffney, superintendent, Lowell & Voltz, Mututse to Grass Creek, Wyo.; **J. R. Gilliland,** General Geophysical Co., Alliance, Neb., to Grass Creek, Wyo.; **Paul O. Layton,** Layton Oil Co., Wellsville to Paola, Kans.; **Norman W. Lambert,** chemist, Pure Oil Co., Elkins, W. Va., to Crystal Lake, Ill.; **Donald E. Eschner,** engineer, Sinclair Refining Co., Rutledge to Sharon Hill, Pa.; **W. H. Alexander,** General Petroleum Corp., Fayette, Mo., to Bakersfield, Calif.

J. Lee Cochran, superintendent, Pelical Oil Purchasers, Inc., Lafayette, La., to Lake Charles; **G. E. Boyd,** superintendent, Barnsdall Oil Co., Jennings to Elton, La.; **M. L. Clayton,** Shell Oil Co., Inc., Jeannette, La., to New Orleans; **King W. Massey,** engineer, Shell Oil Co., Inc., Houston, Tex., to Harrison, Ark.; **John R. Leonard,** engineer, Magnolia Petroleum Co., Dallas to Ulysses, Kans.; **N. B. Dismukes,** engineer, S. V. P. M., Dallas to Palembang Sumatra, Indonesia. **L. P. Fadrique,** engineer, Humble Oil & Refining Co., Conroe, Tex., to Houston.

George A. Collins, Standard Oil Co of California, Ventura, Calif., to San Francisco; **Walter Gasser,** engineer, Shell Chemical Corp., Berkeley, Calif., to Houston; **Stanley C. Weber,** superintendent, Keystone-Buffalo Pipe Line System, Holmes to Morton, Pa.; **Howard N. Jensen,** geologist, Superior Oil Co., Farson, Wyo., to Denver; **Charles R. Criss,** engineer, Sohio Petroleum Co., Mount Pleasant, Mich., to Evansville, Ind.; **L. H. Hamblin,** engineer, Texas-Empire Pipe Line Co., Virginia to Patoka, Ill.; **Roy Harris,** geologist, Lion Oil Co., El Dorado, Ark., to Midland, Tex.; **Ernest A. Ehlers, Jr.,** engineer, Gulf Oil Corp., Austin to San Antonio, Tex.

E. E. Davis, Phillips Petroleum Co., Clarkwood to Taft, Tex.; **Roy A. Moore,** superintendent, Rowan Drilling Co., Hobbs, N. M., to Big Spring, Tex.; **J. J. August,** General Petroleum Corp., Whittier, Calif., to Los Angeles; **William J. Kemnitzer,** consulting engineer, Sacramento to Laguna Beach, Calif.; **Dale Nix,** superintendent, Arabian American Oil Co., San Francisco to New York City; **R. W. Blackburn,** engineer, Continental Oil Co., Eunice, La., to Rio Grande City, Tex.

DEATHS

Lloyd J. Broussard, 22, Maurice, La.; **John B. Hebert,** 29, Lafayette, La.; **Paul Joseph DeJean,** 35, Port Barre, La.; and **Boyd M. Choate,** 22, Abbeville, La., all members of a Superior Oil Co. offshore drilling crew, were killed in an automobile accident near Lake Charles, August 29.

Fred A. Gordon, 67, pioneer oil operator of the Mid-Continent area, died in Topeka, Kans., August 29.

Hiram Norcross, Jr., 42, vice president of Shell Development Corp., died in England recently.

C. S. McIlroy, 71, retired veteran oil field worker for Phillips Petroleum Co. at Vernon, Tex., died August 25.

Karl S. Albert, consulting petroleum engineer, Casper, Wyo., died August 29.

Victor Benson, 61, sales manager for Pennzoil Co., Oil City, Pa., for 12 years, died August 31.

Herbert G. Latilla, chairman of National Mining Corp., Ltd., died in England August 16.

Richard J. Flood, 73, manager of Republic Supply Co. at Tulsa, died August 31.

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TIDE WATER'S

BOTTOM-HOLE PRESSURE 12,635 P.S.I.

at depth of 13,000 ft.

RECORD-BREAKING WELL

DRILLED BY ROWAN DRILLING CO.

by

Leigh S. McCaslin, Jr.

District Editor

This christmas tree caps the Tide Water Associated Oil Co. 1 State Lease 1299, which was recently completed as the highest-pressure producing oil well in the Mississippi Delta area. On official state potential test the well registered a flowing tubing pressure of 7,900 psi. while flowing 157 bbl. of 38° A.P.I. gravity crude in 24 hours on a 3 32-in. choke. Equipment in the tree is 15,000-psi. test

A VERY high-pressure oil well has been successfully completed by Tide Water Associated Oil Co. 25 miles south of New Orleans. On official state potential test the well registered a flowing tubing pressure of 7,900 psi. while flowing 157 bbl. of 38° A.P.I. gravity crude in 24 hours on a 3/32-in. choke. Production is being obtained from an open-hole interval, 12,994-13,050 ft. The calculated original bottom-hole pressure for this zone was 12,635 psi. at 13,000 ft.

Tide Water's record-breaking well is located on a 7,000-acre block in Bayou St. Denis on the northern edge of Barataria Bay some 7 miles south of LaFitte field, Jefferson Parish, La., and near the settlement of Manila Village. The detailed spotting of the well is State Lease 1299, 25-18s-24e. The general area of this well is noted for high-pressure production. Such fields as Leeville, Four Isle, and Delarge are located within a 50-mile radius.

Maximum mud-weight pressure gradients have been compared on a number of wells, and present information indicates that this is the highest-pressure producing oil well in the Delta area. A maximum pressure gradiant of 0.975 lb. per foot of hole was established for the well at Manila Village, which is very close to the weight of the overburden. In Four Isle field in Terrebonne Parish, Superior Oil Co. of California has two wells which approach this figure. Its 4 L. L. & E. had a gradient of 0.955 while drilling to a total depth of 14,564 ft., using maximum mud weight of 18.3 lb. per gallon. Its 1 L. L. & E. came close to its sister wells with a maximum gradient of 0.948 while using maximum mud weight of 18.2, drilling to 13,230 ft.

Spudded in September 1948

Tide Water 1 State Lease 1299 was spudded September 2, 1948. Operations were normal for Gulf Coast drilling down to total depth of 13,050 ft. The casing program to this point had been 2,438 ft. of 10¾-in., 8,973 ft. of 9⅝-in. and 12,480 ft. of 7-in. casing. A good sand was indicated on the driller's log for the interval 12,985-13,007 ft., and operators planned to set liner on bottom and perforate for production. However, at this point high pressure came into the picture, and the well was not completed until 21 days had elapsed and 3,000,000 lb. of mud and chemicals had been used.

While coming out of the hole after reaching 13,050 ft., the well started coming in. The drill pipe, which was at 9,300 ft., caught on the rams, and the pressure built up quickly to 6,500 psi. This pressure was continued by two 10,000-psi. test blowout preventers.

At this point 18-lb. mud was pumped into the drill pipe and the casing bled off. Casing pressure was reduced to 3,700 p.s.i., and the well made 5 bbl. of 56° A.P.I. gravity

Left: Changing switchers requires boat transportation. Nearest boat landing is 12 miles distant. The well is produced through a high-pressure separator into the barge in the foreground. Men in the picture are Tom Bennett, switcher, and James F. Eggleston, district foreman. Right: James F. Eggleston gages the 1,800-bbl. capacity barge which handles production. The well is currently producing its daily allowable of 165 bbl. through a 3 32 in. choke, with tubing pressure of 7,600 psi.

water white distillate and 45 bbl. of dark green 40° crude. Since the well has been on production it has produced light green crude of 38° gravity.

After circulation had been regained, a 5-in. liner of 18-lb. N-80 casing was run. The liner stopped at 12,944 ft., and was cemented at this point, with the top at 12,181 ft. and the bottom at 12,944 ft. The bottom of the liner was squeezed with 85 sacks of cement and the top with 300 sacks.

The next step was to clean the bottom of the hole out to the original total depth of 13,050 ft. While cleaning out the hole it was necessary to use 18.8-lb. mud to hold the formation. Several unsuccessful attempts were made to run an electric log in the hole below the liner.

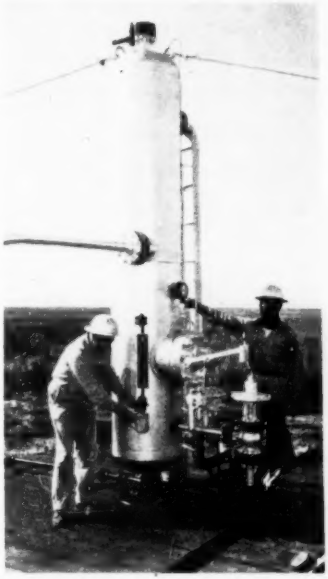
A packer was set at 12,930 ft. with a 60-ft. $1\frac{1}{4}$-in. double extra-heavy stinger. The bottom 5 ft. of the stinger was perforated with 61 $\frac{1}{4}$-in. holes. Tubing string was 9 per cent nickel alloy, $2\frac{3}{8}$-in. upset tubing with Hydril type C.S. thread which was set with a packer at 12,271 ft., inside the 5-in. liner. Each joint of tubing was tested to 11,300 psi. before being run in the hole. A 15,000-psi. tree was used.

Pressure of 8,050 Psi. During Completion

In completing the well water was pumped down the tubing and mud circulated out behind the tubing until pressure reached 5,000 psi. At this point the packer was set and the tree tied down. The well was brought in very slowly on small chokes. After the well had cleaned itself the maximum tubing pressure recorded was 8,050 psi. while flowing through a 3/32-in. choke.

Complete data for the official state potential test were as follows: 157 bbl. daily of 38° A.P.I. gravity oil through a 3/32-in. choke, with tubing pressure of 7,900 psi., gas-oil ratio 5,500 to 1, and 0.4 per cent b.s and w. Special allowable for the well as set by the Louisiana Conservation Commission, is 165 bbl. daily. The well is produced through a high-pressure separator on shore to an 1,800-bbl.-capacity barge. At this writing the well is producing its daily allowable through a 3/32-in. choke, with tubing pressure of 7,600 psi.

(Continued on page 94)



Tom Bennett, switcher for Tide Water, catches a sample from the high-pressure separator on the Manila Village well. Looking on is James F. Eggleston, district foreman

To protect Tide Water's Manila Village discovery, it was necessary to drive piling around the location. This expensive operation was performed to protect the well from shipping on the heavily traveled route between New Orleans and Grand Isle. A stray or lost craft during storms or heavy seasonal fogs could easily wreak havoc with an unprotected christmas tree

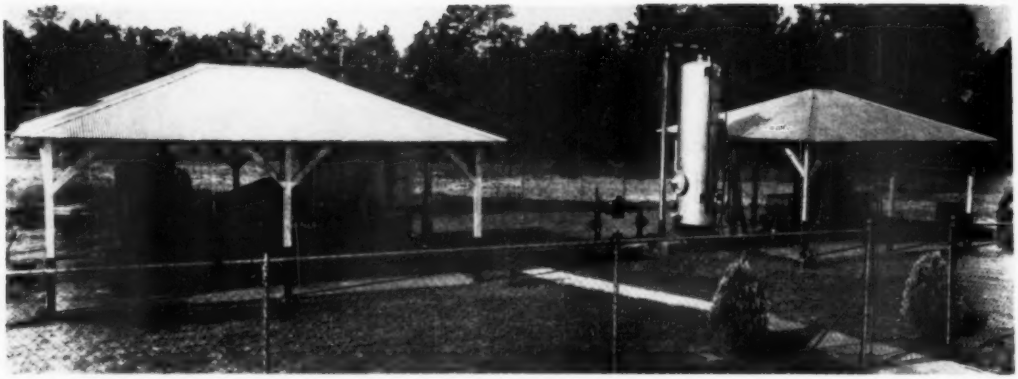


Fig. 1—At right is pumping equipment for fresh water well. In center is sand trap and 3-in. water meter. At left is the gas-engine driven 2½ by 5 by 10-in. pump which injects water to one of the four input wells. A second input well has similar pumping equipment. The other two input wells take water by gravity, and are equipped as shown in Fig. 5

Pressure Maintenance at Magnolia

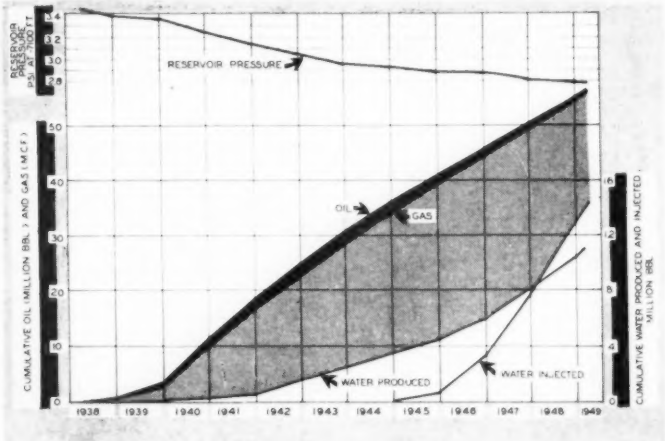
Cooperative Arkansas project successfully checking decline rate in bottom-hole pressures . . .

by D. H. Stormont
District Editor

THROUGH returning all salt water to the Reynolds lime pool and by controlling volumetric withdrawals from the reservoir in line with field rules issued by the Arkansas Oil and Gas Commission, operators in Magnolia field of Southwest Arkansas have held bottom-hole pressures of this reservoir to a nominal rate of decline for nearly 4 years. As a result of this program, which has almost tripled the oil recovered per pound pressure drop, the pool's ultimate oil yield is expected to approximate 122,000,000 bbl., which represents a recovery factor of 50 per cent.

Since a relatively strong water drive already existed in the Reynolds lime pool, engineers familiar with the project have been somewhat reluctant to make any claims as to increased ultimate oil recovery because of the water injections. If fluid withdrawals from the pool were constantly curtailed to about the rate at which water moves from the aquifer into the space formerly occupied by crude oil, reservoir pressures would be maintained in the same manner they are being sustained through water injection. Therefore, they state the principal benefit of the water-injection program is in permitting the oil to be produced at a much faster rate than would be possible under highly restricted withdrawal rates. But, if reservoir pressures had declined, either through failure to fully reduce withdrawal rates or because of non-return of produced brine, studies have indicated that the ultimate recovery might have been at least 40,000,000 bbl. less than that which is anticipated under the program being followed.[1]

Fig. 2—Reservoir performance, before and following water injection



Magnolia field today represents Arkansas' most important accumulation of petroleum thus far found in the Reynolds zone of the Smackover limestone. Of an original content of 244,000,000 bbl. of stock-tank oil, it is expected that an ultimate recovery of 50 per cent may be had. Containing 110 oil producers drilled on 40-acre spacing, the 11-year-old pool by April of this year had undergone a total pressure drop of 691 psi. while producing 56,238,498 bbl. of oil, 55,856,295 M.c.f. of gas, and 11,113,281 bbl. (gross) of water.*

When the Reynolds lime pay was discovered in March 1938 the reservoir pressure was approximately 3,465

*Production and reserve figures quoted are based on Arkansas Oil and Gas Commission figures as reported in Factual Data No. 53, supplemented by monthly data from the Magnolia Pressure-Maintenance and Salt-Water Disposal System for the first quarter of 1949.

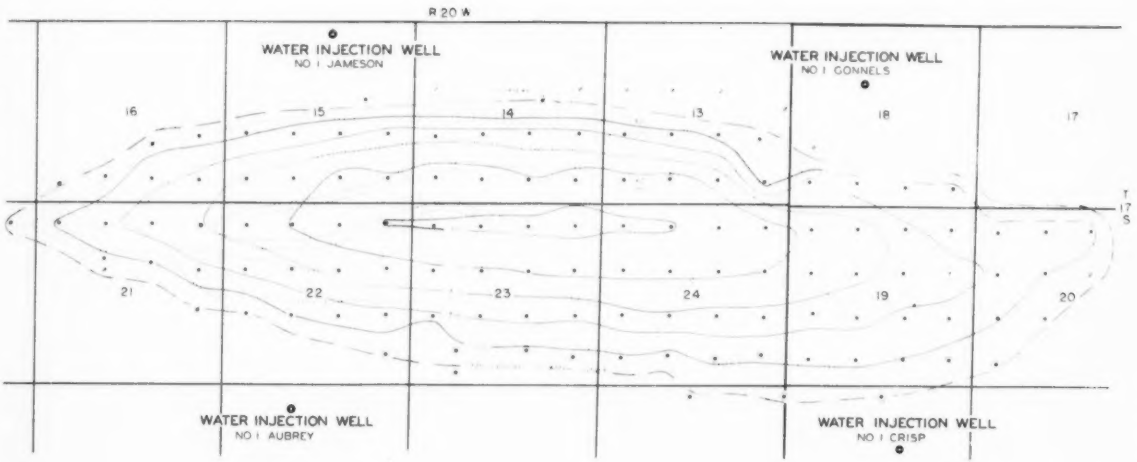


Fig. 3—(Left) Subsurface map of Reynolds lime main porosity, and isopach, Magnolia field

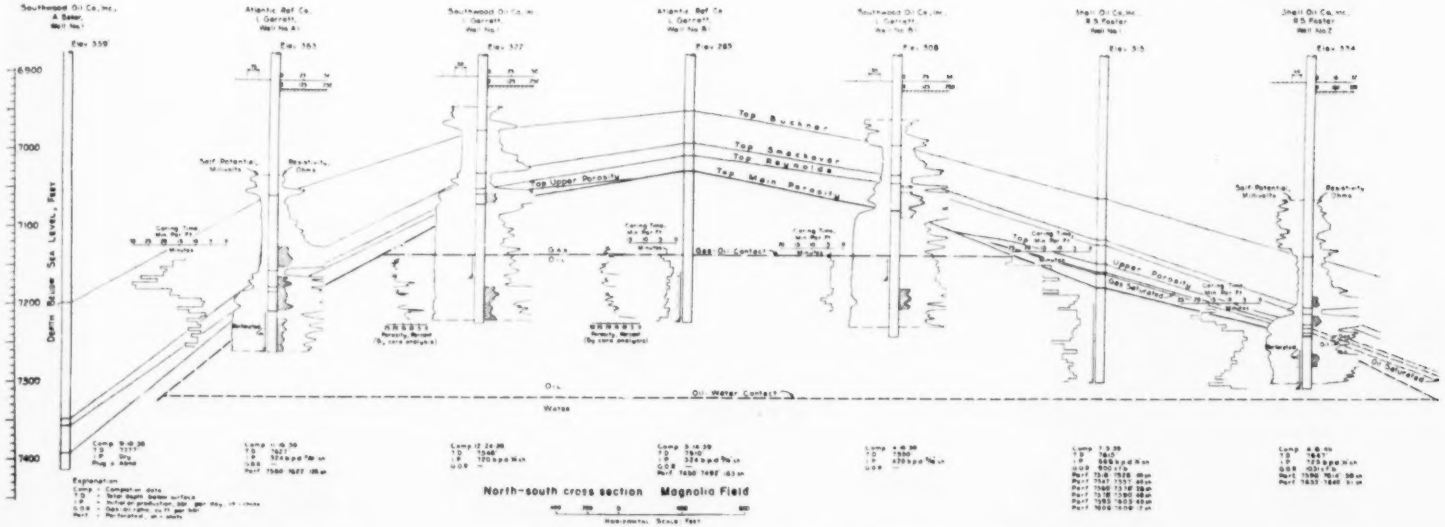


Fig. 4—(Below) Electric-log and coring data, Magnolia field (from U. S. Bureau of Mines R. I. 3720, by Carpenter, Schroeder & Cook)

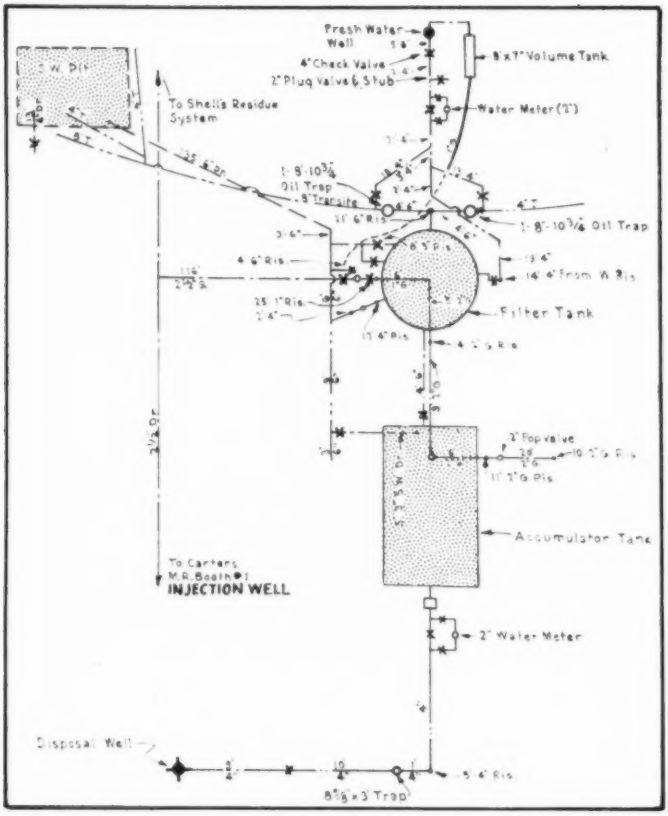


Fig. 5—Construction details of the I M. Crisp filter assembly and disposal well

psi. at 7,100 ft. subsea. By January 1941, when development was completed, the pool contained 115 producers and covered an area of about 1,423 acres. At that time the average pressure was down to 3,236 psi. By the end of June 1945, after producing about 38,808,454 bbl. of crude, approximately 6,085,300 bbl. of brine, and some 33,581,900 M.c.f. of gas, the average pressure for the reservoir was 2,883 psi. Thus up to the time full-scale pressure maintenance was started, in June 1945, the oil recovery was 67,000 bbl. per pound pressure drop.

In April of this year the quarterly survey revealed an average bottomhole pressure of 2,774 psi. Under pressure maintenance, therefore, oil recovery has been approximately 160,000 bbl. per pound drop in pressure, or about 2½ times that being secured before the project was started.

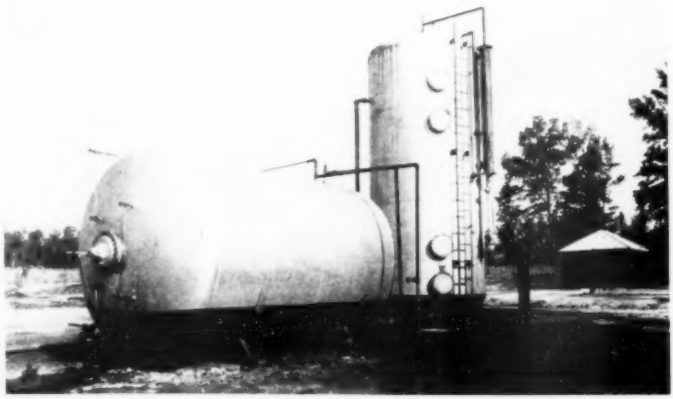
Need for pressure maintenance was recognized early in the field's life. Once the field was fully developed it was plainly evident that the water drive was not sufficient to maintain reservoir pressures at the desired rate of oil production. This was especially true when the increasing volumes of water which have to be produced to obtain the oil were considered. Accordingly, in August 1943 allowables were placed on a strict reservoir voidage basis by the Arkansas Oil and Gas Commission—no well in any one 24-hour period was permitted to produce in excess of 3.75 bbl. of stock-tank oil and 7,500 cu. ft. of gas for each acre assigned the well. Severe penalties for high rates of water production also were incorporated in the allocation formula.

Since then withdrawals have been kept on a volumetric basis, but in November 1946, after water injection had proved effective, the penalties for high rates of water production were relaxed somewhat—to a daily maximum of 12.5 bbl. of water per acre. Currently, under these regulations, each well is allowed to produce 3.5 bbl. of oil and/or 12.5 bbl. of water, and 5,250 cu. ft. of gas for each assigned acre as a maximum in any 24-hour day.

At the time of applying the volumetric withdrawal basis a workover program was also started to reduce the amount of water being produced by some high-ratio wells. The result of these two activities, plus an 800-bbl. reduction in daily allowable rates of oil production, resulted in the field's water production being cut by one-half—from 135,548 bbl. in July 1943 to 68,773 bbl. the following month.

Increasing over-all percentages of water being produced and continued decline in reservoir pressures at the rate of about 6 psi. per month, resulted in the formation of the Magnolia Pressure-Maintenance and Salt-Water Disposal System. The cooperative project, with Carter Oil Co. as operator, was formed in late 1944 and by the end of January 1945 one water injection well was in operation. Three more input wells were soon after completed in the other

Fig. 6—One of the vertical filter tanks and combination accumulator-backwash vessels, as used in the four injection systems serving the four input wells



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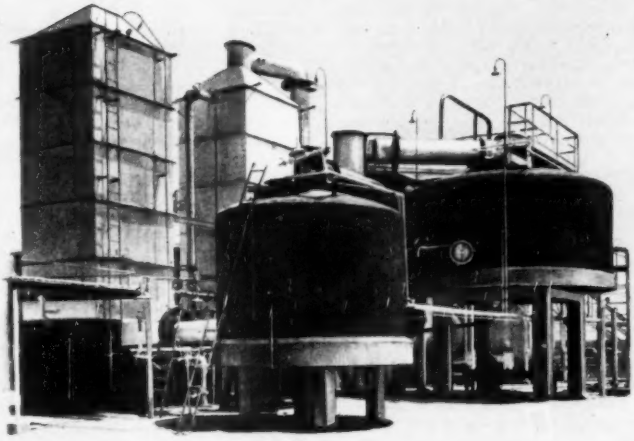

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three quadrants just outside the field, their location being as shown in the accompanying map.

Only salt water was injected at first but in October, following the drilling of 470-500-ft. fresh-water wells near each of the four injection wells, use of fresh water also was started. Volume of water injected to the Reynolds reservoir was steadily increased until in January 1946 it exceeded the amount produced, 141,174 and 120,980 bbl., respectively. The pool's pressure-production history since then is shown in the accompanying diagram.

Reservoir Data

At this point, before taking up current operations at Magnolia, a brief description of the field's geology and reservoir characteristics is in order. Structurally, it is an east-west symmetrical anticline 6 miles long and about 1½ miles wide according to contours drawn on top of the Smackover limestone. (See map.) Oil and gas production is obtained at depths of about 7,550 ft. The Reynolds oolitic zone ranges from less than 1 ft. to 300 ft. thick and contains inconsistent impermeable streaks which tend to complicate studies of water encroachment, reserves, etc. The porosity figure ordinarily used as average for Reynolds pool is 20 per cent. The permeability varies widely throughout the field, ranging from almost zero to several darcys. Average permeability is 1,500 md. Connate water has been reported by some engineers as being 20 per cent while others believe it to run as high as 35 per cent. Oil produced has an average gravity of 38° A.P.I. for the field.

Because of the restricted withdrawal rates, water influx has been able to almost keep pace with withdrawals and therefore Magnolia may be considered to be a water-drive pool. Analysis has shown, however, that the field would become a dissolved-gas-drive pool within a year if the rates of withdrawals were increased from the present rate of depletion of about 4 per cent per year to 8 per cent per year. Gas-oil ratio in December 1948 were 1,082 cu. ft. per bbl. as compared with the original of 700.

In completing the four injection wells, 7-in. casing was set on top of the Smackover. Some 200 ft. of 9⅞-in. hole was drilled and cored into or through the Smackover and a 7-in. casing string run to just above the porous oolitic section. The 9⅞-in. hole below the 7-in. casing then was reamed to 12 in. and the exposed section treated with 10,000 to 20,000 gal. of acid. For tubing, 4½-in. casing was used.

The wells all are located about ½ mile outside the field's original oil-producing limits. No. 1 Aubrey, on the southwest flank, has the best formation for injecting water. The others and their locations, in order of their comparative water-taking ability, are: 1 Crisp, on the southeast flank; 1 Jameson, northwest quadrant; and 1 Gunnels, on the northeast flank. All these wells inject water into the Smackover between 7,400 and 7,500 ft. subsea, below the oil-water contact.

Fresh-water wells were drilled near each input well, being completed in a Wilcox sand at 400-500 ft. deep. These were equipped with 10-in. casing and 6-in. screens, and gravel packed. Surface equipment for these wells consist of pumps averaging 150 g.p.m. in capacity, sand traps, and 125-psi. separators.

A closed salt-water gathering system was installed so that the brine gravitates to all wells except 1 Jameson. This well, being higher than the producing wells, takes only fresh water. At the inception of the project all open gun barrels and atmospheric treaters were replaced with flow-line treaters operating at an average pressure of about 12 psi.

For constructing the gathering and disposal system, 100-psi. working pressure Transite pipe was used. The lines were installed to follow the natural drainage of the area so that the brine gravitates to all injection wells except 1 Jameson. Originally 36 wells on 31 leases were connected into the gathering systems, requiring the laying of 48,800 ft. of 4-in. pipe, 21,100 ft. of 6-in., and 12,632 ft. of 8-in. Today, 41 wells on 35 leases are producing salt water. To connect the additional wells into the four systems required the construction of about 2,600 ft. of 4-in. line and 3,000 ft. of 6-in.

At all input wells except 1 Jameson, vertical filter tanks (10 by 20 ft. or 10 by 15 ft.) and 10 by 15-ft. combination accumulator and backwash tanks were erected. Rating of the filters is 5,000 bbl. daily. Both the filter and accumulators are constructed for a working pressure of 25 psi., and by means of a regulator a 5-lb. blanket of gas from the field residue system is maintained to exclude air from the vessels.

The filters are divided into two compartments with the salt water entering the top half, which is packed with excelsior. By maintaining a constant water level in this section, oil is removed from the brine through a skimming basin and pumped automatically through a diaphragm-operated valve into a nearby earthern backwash pit. Salt water leaving the top compartment flows to the lower or filtering section through an outside water leg. This bottom section contained about 160 cu. ft. of coarse sand (about 2 ft. in thickness) resting on a layer of very porous carborundum plates. To prevent channeling, the water is dispersed by a spreader before it strikes the filter bed. Pipe connections on the filtering section permit the bed to be backwashed with fresh water whenever sediments become so heavy that the filtering capacity is materially reduced.

(Continued on page 101)

TABLE 1—DATA ON INPUT-WELL OPERATIONS DURING APRIL 1949

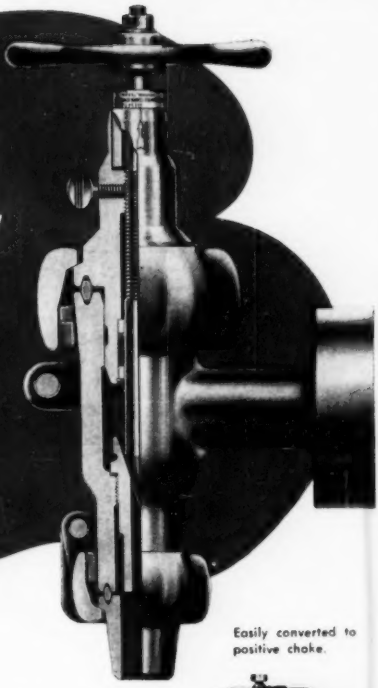
Disposal system—	Aubrey	Crisp	Gunnels	Jameson	Field total
Number leases connected	12	13	10		35
Number wells connected	16	14	11		41
Brine injected, bbl. daily	2,363	2,580	1,860		6,803
Fresh water injection, bbl. daily	2,825	750	380	3,807	7,762
Total, bbl. daily	5,188	3,330	2,240	3,807	14,565
Cumulative brine injection, bbl.	2,267,708	2,761,721	1,508,861		6,538,290
Cumulative fresh water, bbl.	2,417,837	1,835,725	430,968	3,141,463	7,825,993
Cumulative total, bbl.	4,685,545	4,597,446	1,939,829	3,141,463	14,364,283
Well-head pressure (or vacuum), psi. (in Hg.)	(29)	(29)	1,600	700	

TABLE 2—SUMMARY OF REYNOLDS LIME DAILY PRODUCTION AND DISPOSAL VOLUMES FOR PAST 15 MONTHS

	Production			Total water injected	Reservoir voidage (bbl.)		Reservoir pressure at −7,100 ft
	Oil (bbl.)	Water (bbl.)	Gas (M.c.f.)	(bbl.)	Gross*	Net	(psi.)
1948—							
January	12,545	6,425	12,862	10,739	26,465	15,726	2,821
February	12,308	6,138	12,787	11,431	25,999	14,568	
March	12,227	6,161	13,112	13,017	26,328	13,309	
April	12,340	6,462	13,606	13,226	27,207	13,981	2,827
May	12,296	6,789	13,601	14,446	27,505	13,059	
June	12,317	6,738	13,733	13,891	27,606	13,715	
July	12,385	6,816	14,090	13,044	27,997	14,953	2,804
August	12,221	6,878	13,238	14,501	27,168	12,667	
September	12,416	7,613	13,430	15,040	28,206	13,166	
October	12,443	7,105	12,868	15,338	28,347	13,009	2,795
November	12,502	7,608	12,617	14,724	28,194	13,470	
December	12,438	7,844	13,405	15,314	28,475	13,161	
1949—							
January	12,437	7,535	13,272	13,688	27,988	14,300	2,780
February	12,263	7,723	12,594	15,150	27,384	12,234	
March	12,414	7,746	13,424	14,776	28,379	13,603	

*Calculated using formula of Arkansas Oil and Gas Commission.

THE New Unibolt WING VALVE



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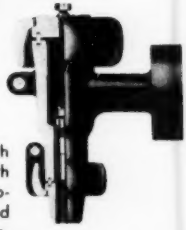

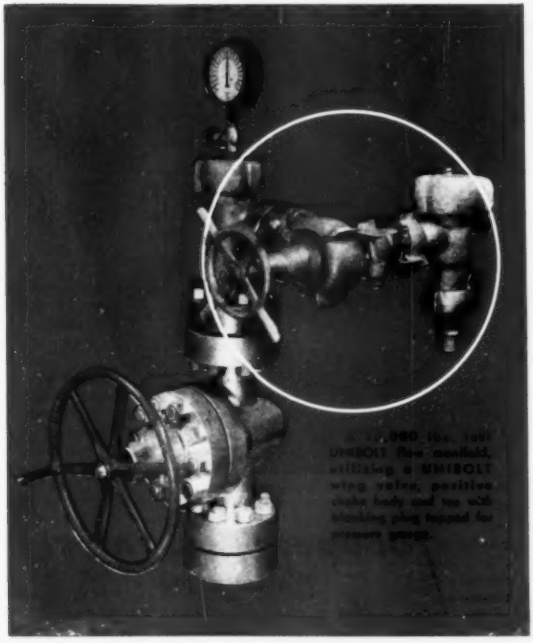

The UNIBOLT WING VALVE, which is popular with production men both as a Christmas tree wing valve to provide a shut-off for choke changing, and a dependable, convenient and inexpensive long-life adjustable choke where well conditions permit, has again been improved. Note in the cross-section view presented above how the stem packing is arranged to eliminate the need for further tightening after the valve is assembled at the factory. Adequate sealing compression is applied to the packing to assure a pressure-tight seal yet permit the stem to turn freely in the packing—"free wheeling". Both the quality of the packing and the mechanical design of the packing compression assembly have been carefully selected and engineered to assure long service and easy operation.

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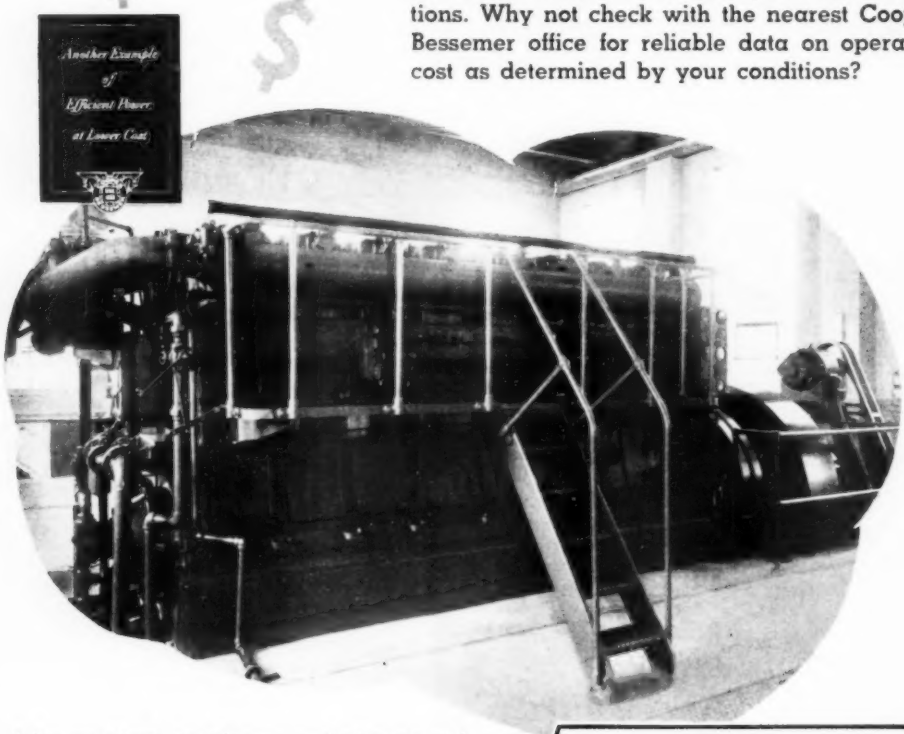

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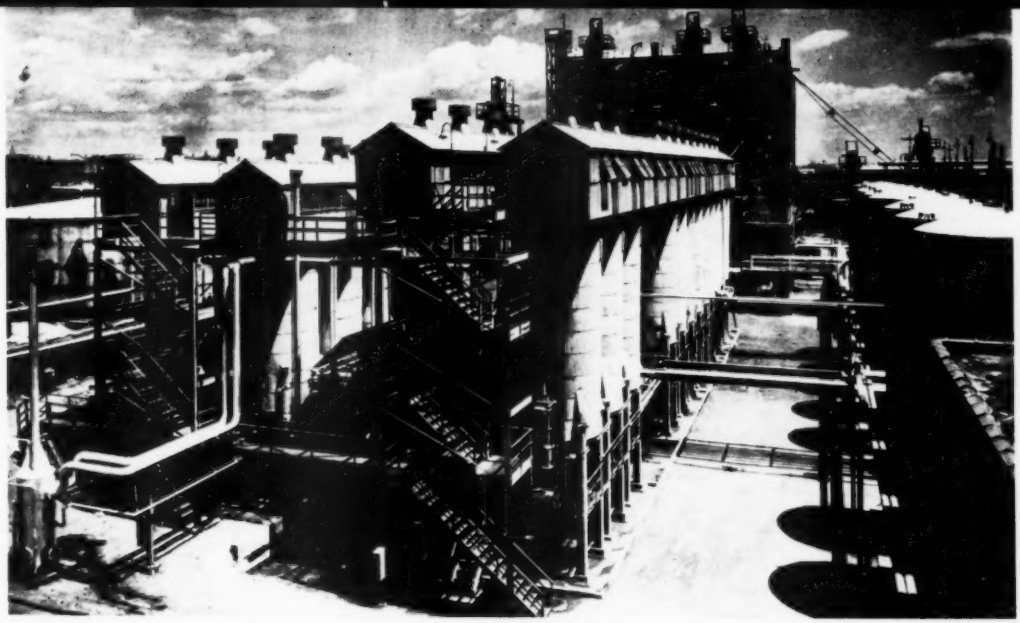


This percolation filtration plant at Tide Water Associated Oil Co.'s Bayonne refinery is one of the largest of its kind. Visible at the left are two batteries of low-pressure spindle filters processing neutral oils. The two rows of high-pressure shells, center, are used for clay filtration of Pennsylvania and solvent-treated Mid-Continent bright stocks and waxes. Running tanks for filtered product appear partially at the right. In the background are three elevators for lifting steamed clay to storage before burning

Flexibility and Efficiency Feature Tide Water Associated Filter Plant

George Weber
Refining Editor

SOUND engineering applied to the design and operation of a large clay-filter percolation plant has repaid Tide Water Associated Oil Co., Inc., with nearly 10 years of efficient service. The plant comprises an important unit of the Bayonne, N. J., works where high-quality lubricants and waxes are refined from Pennsylvania and Mid-Continent grade crudes.

In contrast to usual housed units, the Tide Water Associated filter plant is essentially an open-air installation. This departure from common practice in northern refineries affords the company its principal aim—the elimination of fire and explosion hazards to operators and equipment. Maintenance is much simplified by easy access to all units. Open installation also resulted in lower initial cost and further, provided freedom for design of a functional layout allowing maximum operating efficiency.

Every practical mechanical aid was incorporated into the plant to reduce heavy manual labor in its operation. Full use is made of elevators, screw conveyors, and belt transmission systems in the handling of clay. Instruments and measuring devices augment the normal flexibility of the percolation treating process with precise control, resulting in a high on-stream efficiency.

How Design Evolved

Design of the plant evolved from a comprehensive study of clay-treating methods, undertaken in 1938 when replacement of an old housed filter plant became necessary. Engineers visited every important installation east of the Mississippi and studied operating methods objectively. The best features they observed were combined with original mechanical and instrument adaptations in planning the unit.

One of the largest installations of its kind, the plant is capable of processing simultaneously, up to 50 tons of paraffin wax, 2,000 bbl. of neutral oil stocks, and 1,800 bbl. of bright stocks daily. Two sizes of filters are employed: 24 of 1,800 cu. ft. each and 20 each of 1,600 cu. ft. capacity. Three Herreshof clay burners are installed to revivify 350 tons of spent clay daily. Storage bins are installed in two banks, one for steamed clay to be burned and the other for new or burned clay ready for charging to filters.

These major plant units are so laid out as to afford flexible mechanical movement of clay in any desired combination between storage and burners and filters. The filters are installed in four parallel batteries which adjoin the line of storage bins and burners at right angles. Belt conveyors are installed above and below each row of filters. The upper system handles all clay charged to the units and spent clay is dumped to the lower system for removal.

These conveyor belts connect with screw conveyors which move spent and revivified clay to and from storage. Storage bins are elevated to utilize gravity in dumping to burners and lifter conveyors. New clay, continually added to the system, is un-

loaded and moved to storage mechanically.

Filter Design

The large filters measure 26 ft. 9 in. in height by 10 ft. 3 in. diameter at the top and 9 ft. 6 in. diameter at the upper edges of the bottom cone. The smaller units measure 23 ft. 5 in. by 10 ft. 3 in. by 9 ft. 6 in. Shells are fabricated from 7/8-in. carbon steel. Cones of the 24 larger units have a 45° slope which allows all spent clay to be dumped freely. The 20 smaller units recovered from former service and modified for the new plant, have bottom cones sloped 15° horizontal. The last of the spent clay must be shoveled manually from these filters, hence they are used in slow turnaround neutral-oil service where charging and dumping is less frequent. The newer filters are operated at pressures up to 150 psig. The older smaller ones are restricted to operating pressures up to 30 psig.

Otherwise, all filter units are similarly equipped. Bases are fitted with standard bolted Fulton heads which include segmented dumping valves. Inside each cone are radial channels extending outside the screens.

Clay is retained on 12-0 canvas duck which is backed by a 100-mesh stainless-steel screen, in turn supported on a ¼-in. mesh bronze screen. Each filter is traced or wound helically with four parallel, 250-ft. lines of copper steam tubing. The ⅜-in.-o.d. 20-gage annealed tubing is manifolded into a four-line bank, providing 1,000 lineal feet of winding for each filter shell. All filters are insulated.

Extending across the top of each filter line, corrugated sheet-steel housing provides weather protection for rubber-fabric loading belts, trip mechanisms, control equipment, and filter heads. Outside the housing a double safety outlet is provided at the top of each filter unit. It comprises a safety relief valve and a rupture diaphragm, both of which vent to a blowdown tank. Another fire hazard at ground level has been eliminated. Naphtha leakage from the filter outlet valves tends to settle in partially enclosed spaces to constitute a fire hazard even outside buildings. To prevent this, the area between the filter banks has been paved and traversed with perforated water lines. Water spray removes any collected vapors and flushes out any naphtha-impregnated clay which may fall from above.

Neutral Oils

The 20 low-pressure spindle filters, used exclusively for neutral oils, are laid out in two parallel batteries. The charge manifold includes six oil charge lines and air, naphtha, steam, and vent lines. Oil-charge lines include one spindle wash line used for displacement oil. The outlet manifold has a running line to the compartment, an off-test line, and a still line. Each filter has its own running compartment which is never changed. A battery of 15 blending tanks serves the low-pressure spindle filter bank.

Neutral oil to filters is heated by steam in pipe exchangers. The routine filter cycle is as follows:

	Hours
Clay filling (30 tons)	3
Filling with oil	11
Running to color (time determined by yield)	
Air displacement of oil	4
Recycle displacement of oil	24
Air displacement	12
Naphtha fill and wash	2
Naphtha wash	1
Steamout to still	3.5
Refill naphtha and wash	4
Steam until "sweet" (avg. 22,000 lb. steam)	17
Depressure	2.5-3.0
Clay dump	3.5

The average yield is about 1,140 bbl. per filter load of clay, with individual yields varying from 400 to 2,500 bbl. depending on the stock and the activity of the clay employed. The filter rate for neutrals ranges from 160 to 200 bbl. per day per filter. The operation is carried out at 180 -200° F. incoming charge being heated by exchange with 20-psig. steam at the manifold. Higher yields are obtained on red oils and spindle oils, the yield being inversely proportional to color improvement obtained. Over-all loss in neutral-oil filtration ranges from 1 to 1½ per cent of charge. Both naphtha washes in the neutral-oil cycle move to stills where naphtha is removed, leaving displacement oil used for filter washing.

A number of neutral-oil stocks are filtered in the 20-unit battery. Four grades of 100 per cent Pennsylvania oils range from 150 to 190 seconds viscosity, S.S.U. at 100° F. Several grades of paraffinic solvent-treated Mid-Continent neutrals are produced, ranging from the nonviscous stocks at 70-100 seconds viscosity at 100° F. to heartcut grades in the range of 400-700 seconds viscosity at 100° F. Several tailor-made oils in these viscosity ranges vary in both color and viscosity index according to specification.

Bright Stocks

Ten of the high-pressure filter units comprise the solution filter bank handling bright stocks. They are manifolded at the top for charge oil, steam, naphtha, and venting. The bottom manifold includes a straight running line, an off-test line, and a still line. Solution filters have no air lines and no rundown compartments.

In this section of the filter plant, Pennsylvania bright stock is filtered undewaxed, in 60 per cent naphtha solution and after centrifuge dewaxing and naphtha removal, produces 150-second S.S.U. viscosity stock at 210° F. A temperature of 140 -150° F. is maintained and the charge rate is about 40 bbl. of solution per hour per filter.

The routine cycle is:

	Hours
Clay filling	3
Oil filling	1.5
Soaking	4
Running to color	10-12
Naphtha displacement	1
Steamout	2.5
Naphtha fill and wash	2.5
Steam until "sweet" (18,000-lb. steam)	9
Dump clay	4

The first naphtha washings on solution filters are stored and recycled back to filters as raw solution. The second washings go directly to steam stills where naphtha is removed continuously. One great advantage in using high-pressure filters is the ability to employ 90-psig. steam against a 30-psig. back pressure, for normal steamout operation of high efficiency.

Individual running lines from solution filters enter a common header. Hourly samples are taken from each stream for maintaining a composite sample for each filter in operation. These are compared with standard samples in naphtha solution to determine color limits and end of filter cycle. The filtered product is then dewaxed and stripped of naphtha to produce a finished bright stock.

Two high-pressure type filter shells in the plant are utilized as clay traps to remove final traces of clay from filtered bright stock-naphtha solution. These units are placed on the rundown line with no clay fill, and strip enough clay carried over from the solution filters to become half full about every 6 months, when they are dumped and replaced in service.

For aviation lubricants, bright stocks are further refined in the refinery's new solvent treating facilities prior to filtration. They are then processed through the percolation filter plant in a manner similar to that described above.

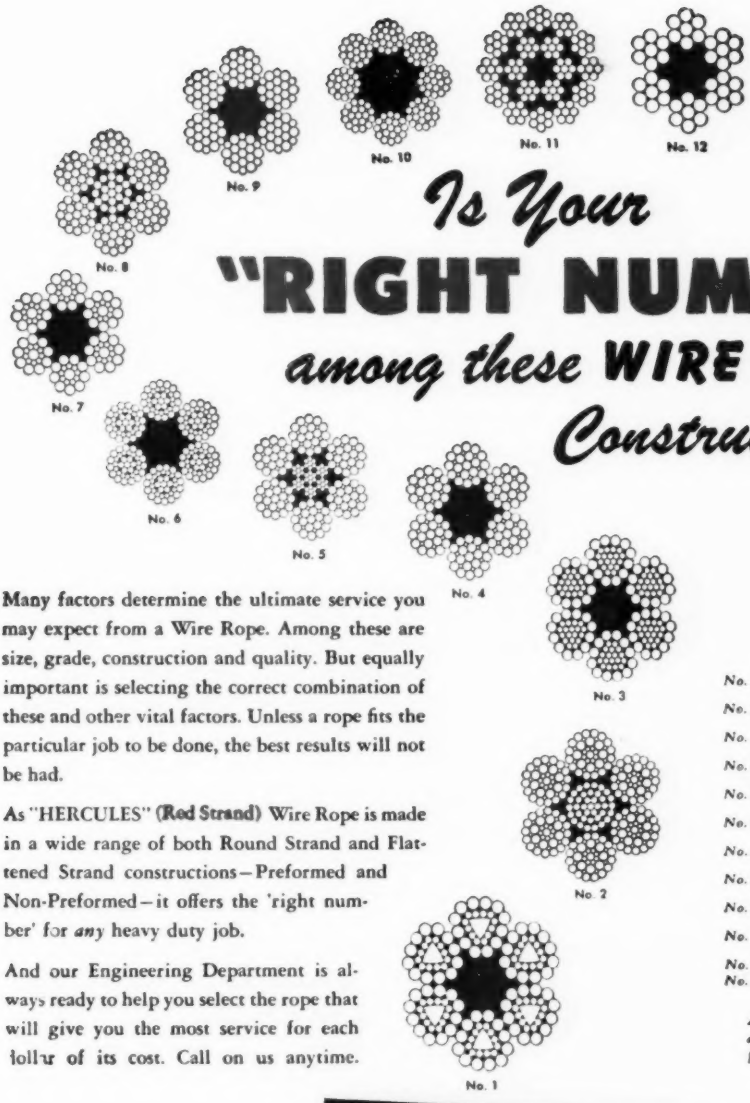
Solvent treated Mid-Continent-type bright stocks also are filtered in the high-pressure-type filters, eight of which are assigned to this service. This stock is percolated through clay without naphtha dilution to finished product specifications, as it has been dewaxed prior to the filtration step. A temperature of 250° F. is maintained and the filter rates average 4 bbl. per hour at 90 psig. Each filter discharges into its own running tank. The routine cycle is:

	Hours
Clay filling	3
Oil filling	36
Running to color	175-185
Naphtha wash No. 1	3
Naphtha wash No. 2	3
Naphtha wash No. 3	3
Steamout	13
Dumping clay	4

Wax Filtering

Wax from either the M.E.K. solvent dewaxing operation or from the wax presses in the refinery, is sweated and then melted by steam heat in tanks or vats before filter-

(Continued on page 101)



Is Your "RIGHT NUMBER" among these WIRE ROPE Constructions?

Many factors determine the ultimate service you may expect from a Wire Rope. Among these are size, grade, construction and quality. But equally important is selecting the correct combination of these and other vital factors. Unless a rope fits the particular job to be done, the best results will not be had.

As "HERCULES" (Red Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions—Preformed and Non-Preformed—it offers the 'right number' for *any* heavy duty job.

And our Engineering Department is always ready to help you select the rope that will give you the most service for each dollar of its cost. Call on us anytime.

No. 1—Style B Flattened Strand—Hemp Center
No. 2—6 x 41 Round Strand—Metallic Core
No. 3—Style G Flattened Strand—Hemp Center
No. 4—6 x 19 Filler Wire Round Strand—Hemp Center
No. 5—6 x 19 Filler Wire Round Strand—Wire Rope Center
No. 6—6 x 37 Round Strand—Hemp Center
No. 7—6 x 19 Seale Round Strand—Hemp Center
No. 8—6 x 19 Round Strand—Metallic Core
No. 9—6 x 19 Warrington Round Strand—Hemp Center
No. 10—8 x 19 Filler Wire Round Strand—Hemp Center
No. 11—18 x 7 Non-Rotating
No. 12—6 x 7 Round Strand Haulage Rope—Hemp Center.

All of these constructions are available either Preformed or Non-Preformed.

Use PREFORMED for Easier Handling and Smoother Spooling

"HERCULES"® the DEPENDABLE WIRE ROPE for any TOUGH JOB

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Use PREFORMED for Longer Life and Greater Economy

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The $40,000 Bath

Splash it high and wide, youngster. That clear, pure water, said to be the softest in the Southwest, was brought to you in part by Continental Oil Company, but in a way you'd never understand.

The story is a little complicated. In 1944, the people of Wichita Falls, Texas voted a bond issue to provide good water for the city. Rising costs soon made the sum voted insufficient. Money had to be saved, if the water was to be provided.

Another oil company had a pipe line which traversed almost the entire length of the reservoir site. This company was eager to cooperate, but its pipe line served a number of stripper wells, and it could not legally cut loose from these wells. Nor did it feel morally free to abandon these wells, either. The owners were entitled to sell the oil that was being produced on their property.

The Mayor of Wichita Falls appealed to the oil industry for help. Two other companies were able to serve most of the small wells. But one lease was still without a connection, unless the original line was left intact or moved.

The Mayor appealed to Continental Oil. The problem was explained. The Continental pipe line superintendent appealed to the Company's general office. Within a few hours, the wire came back.

BUILD AN EXTENSION OF OUR LINES TO THAT LEASE, SO THAT THE CITY OF WICHITA FALLS CAN HAVE ITS WATER SUPPLY.

Continental's expenditure on this extension saved the city of Wichita Falls approximately $40,000. At the time Continental realized that the revenue from the small amount of oil hauled through the pipe line would not pay for the cost of the extension.

Continental Oil Company doesn't measure its participation in civic affairs in dollars and cents. Whether its operations are manufacturing, production or marketing, Continental Oil Company, and all the other members of the oil industry, are active, practicing citizens of America. They share with you . . . and every American . . . in the responsibilities of citizenship.

CONOCO **Continental Oil Company**

PERFORMANCE SIGNIFICANCE OF
LABORATORY OCTANE NUMBERS

by L. A. McReynolds* and A. W. Suderman*

THE performance significance of motor or research octane numbers used singly, is limited. A weighted average of these laboratory ratings may more satisfactorily be used to predict the antiknock performance of a gasoline in currently available cars. It is the purpose of this article to present data from which a satisfactory relationship was developed.

The octane number of a fuel as such is not of particular interest to the automobile driver; what he wants is satisfactory knock-free performance, and fundamentally this is what the fuel manufacturer is striving to give him. Similarly the automobile manufacturer is interested in establishing the design and adjustment of his engine to effectively utilize the antiknock quality of available fuels.

It should be pointed out that knocking as normally encountered in passenger automobiles is seldom sufficient in itself to affect the performance of the car to an extent that can be readily measured. However, the sound of any but very light knock is often objectionable to the average driver. Road test evaluation of antiknock quality of gasoline must therefore take into account the foregoing psychological factor and in addition consideration must be given to the variety of types and makes of cars, their condition of maintenance and adjustment, road conditions such as grade, temperature, etc., and the motoring habits of millions of car drivers. Considering these factors, fuels were rated by the road test procedure used in these studies at the borderline region betwee trace knock and no knock and under operating conditions above average in severity.

*Research department, Phillips Petroleum Co., Bartlesville, Okla.

The idea of using laboratory results obtained by both the motor and research methods to predict the road performance of a fuel is not new. A review of the technical literature shows wide recognition of this point, and included in the literature are contributions of recognized experts in this field who present data supporting the idea of using a combination of results obtained by the motor and research methods for best correlation with performance in modern automobiles.[1,2,3,4].

Some differences in opinion have been expressed concerning the specific relationship of the two methods that should be used. The data herein reported show that the best average correlation with road performance is obtained when laboratory ratings for a given fuel are weighted between 60-75 per cent research rating plus 40-25 per cent motor rating. The resulting value is referred to as weighted index octane number.

Test Procedures

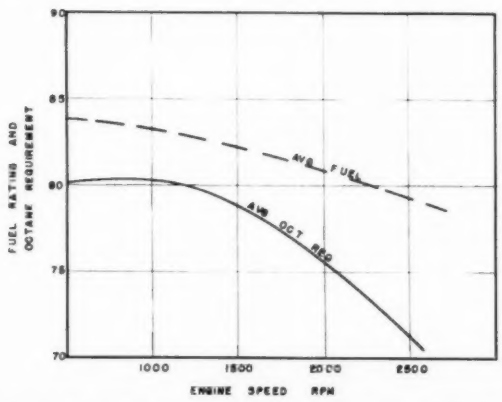
The laboratory antiknock data were obtained using the A.S.T.M. standard method of test by the motor method designation D357[5] and the A.S.T.M. tentative method of test by the research method, designation D908[6]. A single-cylinder, variable-compression-ratio, internal-combustion engine is used for both of these test methods.

For the motor method the speed of the engine is maintained at 900 r.p.m., the fuel and air mixture before going into the combustion chamber is heated to 300° F. and the spark advance is varied in accordance with the compression ratio used.

For the research method the engine is maintained at a speed of 600 r.p.m., the inlet air only is heated to 125° F., and the spark advance is fixed at 13 before top dead center. Other engine conditions are the same for both methods. The difference in fuel ratings obtained by these two test methods is commonly referred to as sensitivity or jump.

The Borderline road test method[4] was used in this investigation. This procedure follows in all significant details the test technique developed as a result of cooperative studies by the Coordinating Research Committee. Briefly this procedure consists of selecting a car which is standard except that the automatic spark advance device is made inoperative so that it may be manually controlled at desired values during test runs.

Before commencing test work the car is driven until all operating temperatures have stabilized. The spark advance is set to a given value, the car is accelerated at full throttle, and the speed at which knocking



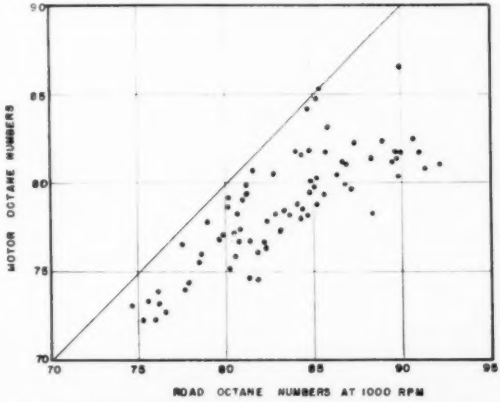


Fig. 1—(Left) Composite octane requirement and fuel-rating curve. Fig. 2—(Right) Comparison of road ratings at 1,000 r.p.m. and motor octane numbers

How Darling features prevent trouble and expense

"This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:

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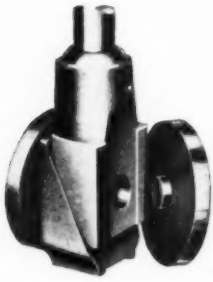
CORROSION RESISTANT VALVES

In addition to conventional iron, bronze and steel constructions, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined, with special alloy trim; all bronze; and all special alloy. Darling's 50 years of experience in meeting unusual requirements is always at your service.

UNIFORM WEAR DISTRIBUTION



A LARGE percentage of valve leaks, lost time, expense, can be blamed on uneven wear—the uneven wear caused by repeatedly exposing the same disc and seat areas to concentrated pressure, fluid flow, and resultant galling from operation.

For years such leaks were considered the result of normal, expected wear. But the unique design of Darling Double Disc Parallel Seat Gate Valves has proved that uneven wear can be prevented. The two valve discs shown in the cutaway view, and again in the removed inside assembly, are separately and independently hung and free to revolve through their 360°. Valve operation aids the action during the lowering and raising of the disc assembly. The discs never seat twice in the same position and obviously wear is bound to be uniform. This results in tight closure even when the disc faces are worn.

Hundreds of Darling gate valve users have learned by experience that uniform wear distribution results in longer service life and correspondingly lower maintenance cost.

DARLING VALVE & MANUFACTURING CO.
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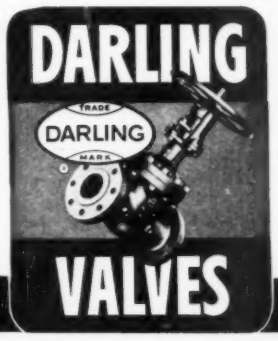
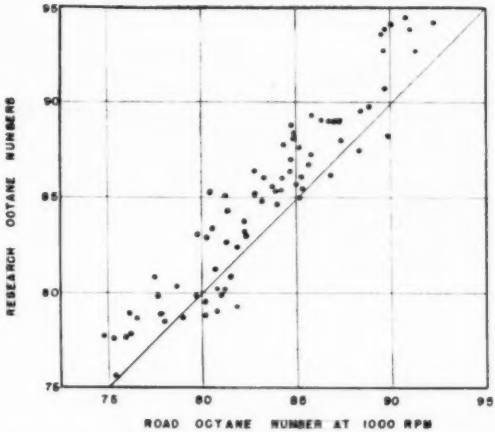
Outline your service requirements and get complete *information on Darling Valves of the proper type. Or, send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of* all *types for* every *normal or unusual service, and for pressures up to 1500 pounds. It's full of helpful information . . . Yours for the asking.*



THE VALVE MARK OF QUALITY . . . WATCH FOR IT



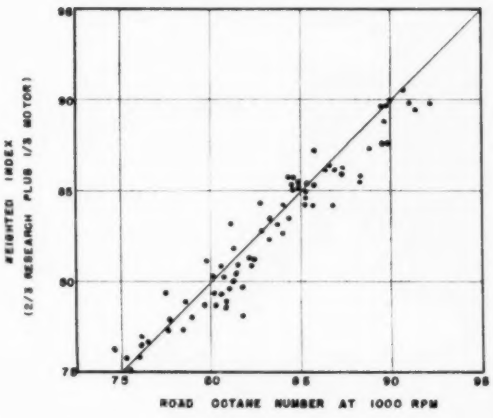


Fig. 3—(Left) Comparison of road ratings at 1,000 r.p.m. and research octane numbers. Fig. 4—(Right) Comparison of road ratings at 1,000 r.p.m. and a weighted index of two-thirds research plus one-third motor octane numbers

ceases is carefully noted. By making a series of runs at different spark settings it is possible to develop spark advance-speed relationship curves for a fuel over the speed range of the engine, or to as high a speed as can be legally obtained. By following the same procedure using a series of reference-fuel blends of known octane number it then becomes possible to assign road octane numbers to the test fuels used in the investigation.

Some of the special instrumentation used to assist in improving accuracy of road test results included an engine stethescope made up in our laboratory consisting of an external-type pickup, a two-stage battery-operated amplifier, and a set of high-impedance earphones. A positive action, non-backlash spark-advance control mechanism was also employed.

The test fuels used in this investigation were limited to commercial types of gasoline which were either secured at filling stations or bulk stations, or blended from ingredients regularly used in commercial motor gasolines. A total of 76 fuels were included. A total of 89 different cars representing 8 types and models, were used to secure the test data.

Results

Data show that the motor octane number of the fuels used ranged from 72.1 to 86.5. The research rating ranged from 75.8 to 94.5 and the jump or sensitivity from 0.2 to 13.0.

Fig. 1 shows the average octane requirement over the speed range of all of the vehicles used in this investigation for which this information was obtained. This is represented by the solid line. The average road rating for all the fuels used in the investigation is also shown on this same figure, as represented by the divided line. These composite data are shown only for the purpose of illustrating that the average fuel in the average car is most prone to knock, under the operating conditions employed for these tests, at engine speeds around 800 to 1,100 r.p.m. For this reason 1,000 r.p.m. was chosen as representing the most critical engine speed; however, consideration is given to other engine speeds in the subsequent analysis.

Fig. 2 illustrates the absence of agreement between road octane ratings at 1,000 r.p.m. and motor octane ratings. The algebraic deviation of road ratings from motor ratings was +4.67, the average deviation was 4.67, the root mean square deviation was 5.37, and the maximum deviation was 11.0. Obviously very little can be done in the way of predicting road ratings in the critical speed range with motor octane ratings.

In Fig. 3, a comparison of research method ratings and road octane ratings at 1,000 r.p.m. is shown. Using this system the algebraic deviation of the road ratings from research ratings was —1.58, the average deviation was 1.88, the root mean square deviation 2.15, and the maximum deviation 4.6. While the research ratings were somewhat better than the motor ratings in predicting road ratings, an examination of the two figures shows that a more accurate method of predicting road ratings should be in some combination of the two laboratory methods, with greater emphasis given to the research values. Several combinations were used, and of these a weighting system of one-third motor rating plus two-thirds research rating proved to be one of the best of the combinations tried.

Fig. 4 shows the degree of agreement between road ratings and a weighted index rating factor of one-third motor plus two-thirds research. With this weighting system the algebraic deviation of road ratings from the weighted laboratory rating was +0.54, the average deviation 1.01, the root mean square deviation 1.29, and the maximum deviation 3.6. A comparison of the three figures brings out very definitely the superior ability of a weighted laboratory octane number to predict road ratings in the critical operating range, both from the standpoint of spread and cleavage to the equality line.

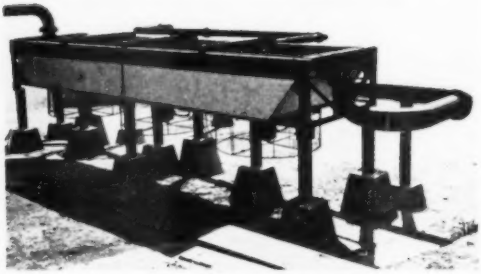
It is possible that some further improvement in correlation could be obtained by finding the exact optimum weighting for the data being considered. However, experience has shown that this optimum weighting will vary depending mainly on fuel composition and engine design, within the limits previously indicated and for this presentation the two-thirds research plus one-third motor value has been selected to illustrate the value of a weighted index system because it gives excellent correlation with road performance in the critical speed ranges and fair correlation at higher speeds.

To complete the picture, consideration should be given to the ability of weighted index octane numbers to predict road performance of typical fuels at engine speeds other than 1,000 r.p.m. Fig. 5 shows the deviation of motor, research, and weighted index octane numbers from road octane numbers for five fuels, chosen because they represent fairly well the variety of blends that may be encountered in the present-day commercial motor gasolines, tested in five present-day automobiles.

An examination of Fig. 5 shows that the weighted index system is somewhat better than either motor or research ratings throughout the speed range covered. It is indicated that a heavier weighting of the motor values would improve the correlation at 2,500 r.p.m., but would hurt the excellent correlation that is apparent at lower speeds.

Two significant requirements of a control octane number are its ability to predict road performance in the critical range and to insure a product

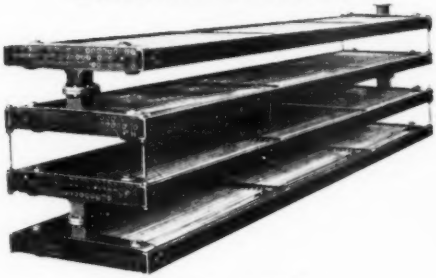
FIN-FAN EXCHANGER

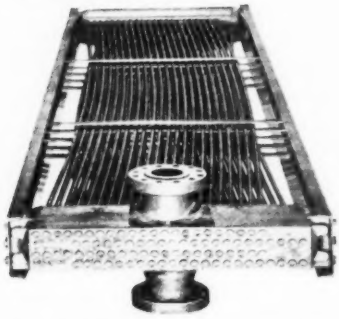


Developed jointly by Fluor Corp. Ltd. and The Griscom-Russell Co.

A "package type" air-cooled condenser or cooler that can be installed on the ground, within a building, or on a roof, and operates independently of the direction or velocity of surrounding air currents. Upper illustration: small FIN-FAN installation operating out-doors. Lower illustration: G-R K-FIN Air-Cooled Section which provides the FIN-FAN heat transfer surface. Described in Bulletin 1231.

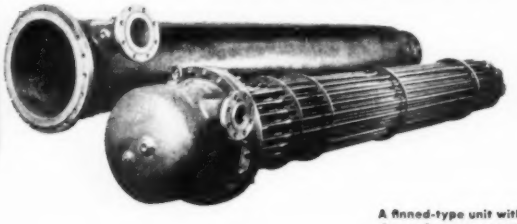
BENTUBE SECTIONS

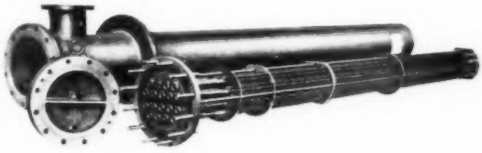




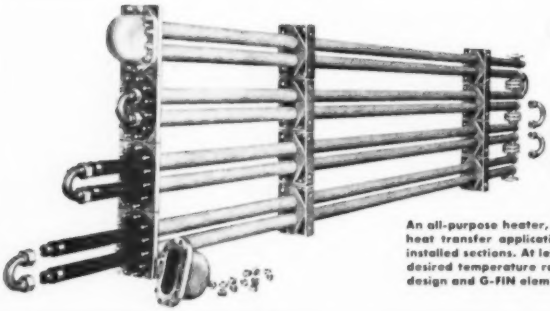
Atmospheric or submerged cooling or condensing sections with scale-shedding feature that eliminates the need for hand-scaling. Used by more than 400 refineries and natural gasoline companies. Upper illustration: stack of Bentube Sections. Lower illustration: top view of Bentube Section showing cold curvature of the Bentube elements. Described in Bulletin 1602.

G-FIN STORAGE TANK OIL HEATER

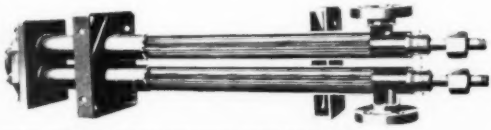




A finned-type unit with many advantages for heating viscous liquids to be withdrawn from storage tanks. At left: design for installation outside of tank. At right: design for installation partly inside of tank. Described in Bulletin 1642.



TWIN G-FIN SECTION



An all-purpose heater, cooler, condenser or heat exchanger having the widest heat transfer applications of any design on the market. More than 50,000 installed sections. At left: stack of TWIN G-FIN SECTIONS connected in series for desired temperature range. At right: cut-away view of section showing simple design and G-FIN elements. Described in Bulletin 1614.

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

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as well as special designs in HEAT TRANSFER APPARATUS

Besides its many special designs in heat transfer apparatus, Griscom-Russell also has *standard* designs that enable you to save time required for special engineering development and manufacturing processes.

Some of these standard units are shown and briefly explained on the opposite page. They include apparatus for practically every standard heating, cooling, condensing and heat exchange service, and for many special services . . . units with bare tube and finned tube heat transfer surfaces . . . units for cooling or condensing with water or air . . . units for heating with steam or hot liquids. Each type has thoroughly proven its effectiveness, excellent design, and sturdy construction in thousands of installations, and is based on the Griscom-Russell 80 years of experience in specializing on heat transfer apparatus.

Write for bulletins describing in detail the units that may meet your requirements for heating, cooling, condensing or heat exchange processes. Your request for further information involves no obligation.

THE GRISCOM-RUSSELL CO.
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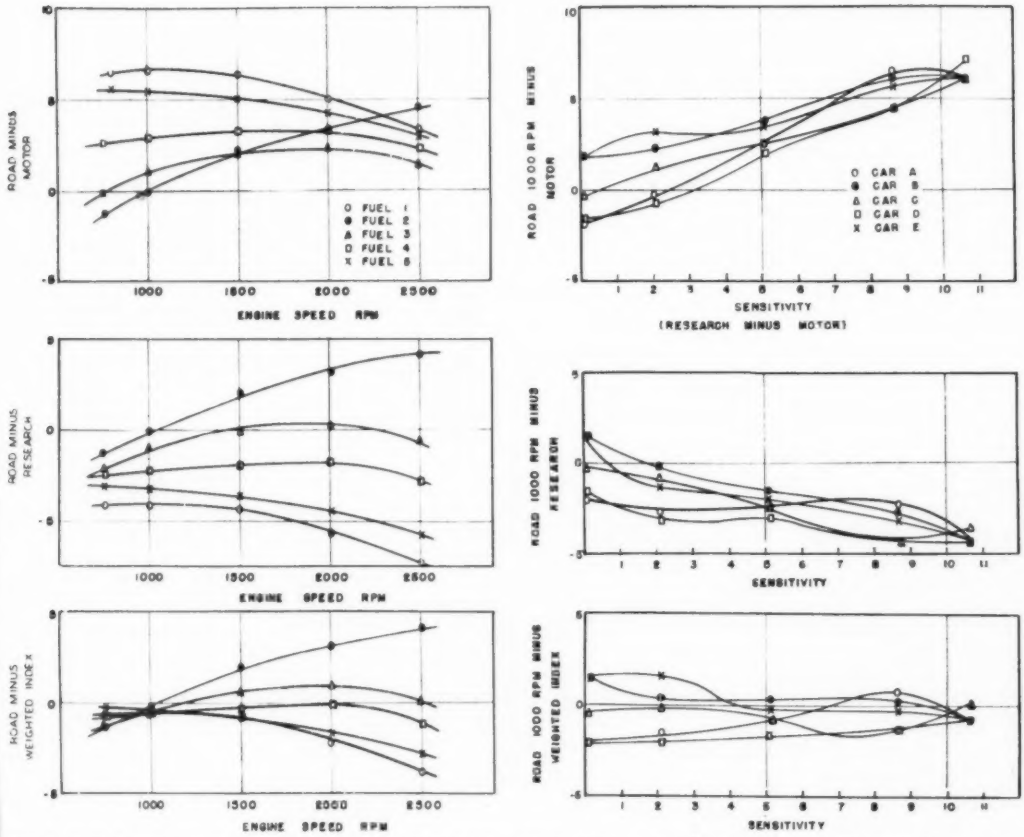

Fig. 5—(Left) Relationship of motor, research, and weighted index octane numbers and road ratings. Fig. 6—(Right) Effect of fuel sensitivity on the relationship of road and laboratory octane numbers

of uniform performance regardless of composition. The preceding data show that a weighted index octane number, that is a weighted average of the research and motor octane number ratings in the proportion of two-thirds and one-third is reasonably satisfactory.

Included in the fuels were five having the same weighted index octane number. These fuels vary in motor octane number from 78.1 to 85.3, in research from 85.4 to 88.8, and in jump from 0.1 to 10.7, all having weighted index of 85.2 to 85.6. Road test data obtained in five different types of present-day cars using these fuels furnish additional support to the significance of weighted index octane numbers.

Several of the other fuels have weighted index values within the 85.2-85.6 range, but they were not tested in the five current-model cars so were not included in this comparison. Fig. 5 illustrates the excellent correlation between weighted index octane rating and road antiknock performance as compared to the motor and research values.

Fuel sensitivity or jump has been an increasingly important consideration in recent years. Fig. 6 has been prepared to show the effect of varying sensitivity on the degree of agreement betwen road octane ratings and the motor, research, and weighted index octane numbers of the five fuels mentioned in the preceding paragraph. It can be seen that varying sensitivity has little effect on the road-weighted index relationship while increasing sensitivity tends to increase the differences between road and the motor and research values.

Conclusions

Two essential requirements of a control octane number are: (1) It must predict road antiknock performance in the critical operating ranges, and (2) it must insure a product of uniform performance regardless of composition. Data on performance of commercial gasolines in automobiles accumulated during postwar test work have been presented herein and lead to the following conclusions:

1. Neither the motor nor research octane numbers when used individually presents a satisfactory control.

2. A combination of motor and research octane numbers, with slightly more emphasis on research values (for data presented herein two-thirds research plus one-third motor) presents an excellent control for antiknock performance of present-day fuels in present-day automobiles.

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5. "A.S.T.M. Manual of Engine Test Methods for Rating Fuels," 1948.

6. Coordinating Research Council, Inc., "C.R.C. Handbook 1946."

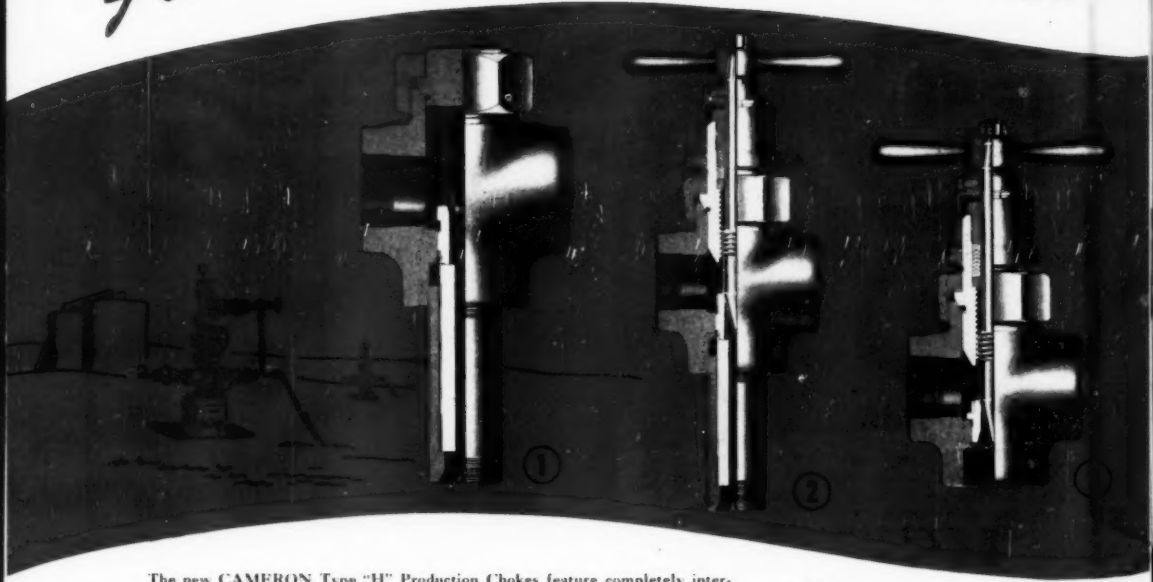
ANNOUNCING

THE NEW TYPE "H"

CAMERON PRODUCTION CHOKES

designed for maximum

Flexibility in Flow Control



The new CAMERON Type "H" Production Chokes feature completely interchangeable components which provide maximum flexibility of choice in arranging flow control assemblies. The plain positive choke can be converted to an adjustable choke or to a combination positive-adjustable unit by merely interchanging a few parts. Flow beans used are standard and interchangeable in all other CAMERON Chokes and Flow Wings.

The choke body is of CAMERON forged steel and is available with threaded or API flanged connections in either tee or cross type. Needles, seats, and bean retainers are made of hardened stainless steel for maximum wear and corrosion resistance, with special hard-faced needles and seats available for wells where severe sand cutting exists.

Available with threaded or flanged inlets for 2000 lbs. and 3000 lbs. or with flanged inlet for 5000 lbs. W.P.

(1) **POSITIVE CHOKE**—Changing flow beans in this choke is fast, safe and easy. As the bonnet nut and blanking plug is unscrewed, pressure trapped in the unit is automatically relieved. The bean is carried in a retainer, and is retrieved with the retainer when it is unscrewed.

(2) **COMBINATION POSITIVE-ADJUSTABLE CHOKE**—This variation is made by substituting a needle and bonnet assembly for the blanking plug. The upstream end of the bean retainer is designed to function as an adjustable needle seat.

(3) **ADJUSTABLE CHOKE**—Removal of the cage nipple and substituting a seat for the positive bean retainer results in an efficient adjustable choke. The calibration marks on the index assembly are large and easily read, and no special tools are required for setting zero on the index.

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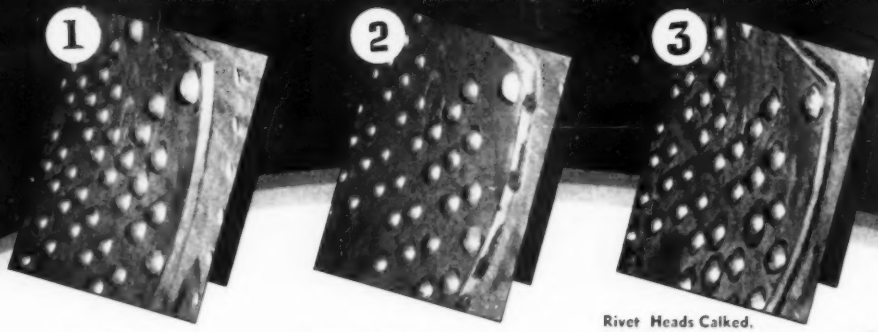

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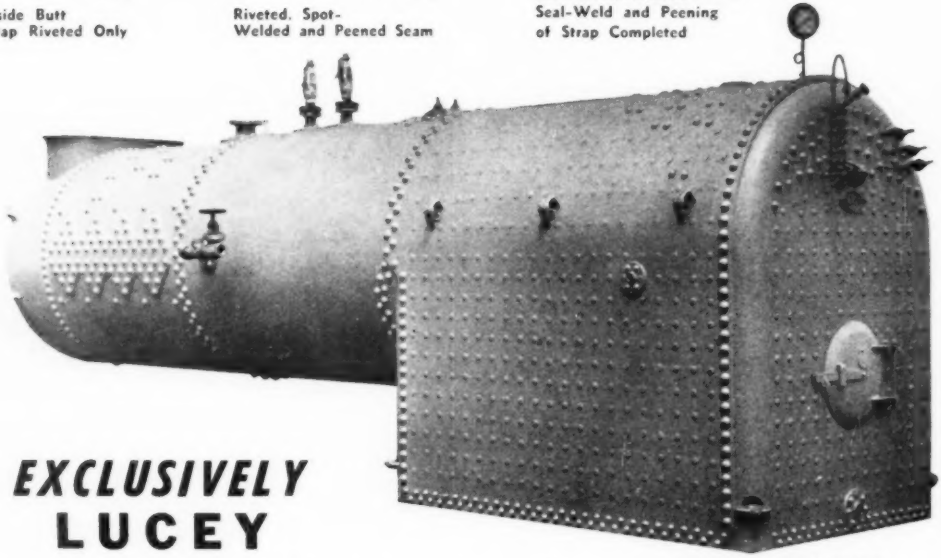

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Compressibility Factors of Natural Gases

by Paul Buthod*

ACCURATE volumetric data are important in nearly all engineering calculations involving natural gases. The pressures encountered in most gas fields and pipe lines preclude the use of the simple gas laws if accurate results are desired. This article will present a simple method, employing charts, of obtaining volumetric data corrected for compressibility.

Deviations from the ideal gas law have been studied by many investigators (selected references are included here). The general equation, which incorporates the compressibility factor, is:

$$V = ZV_i$$

Where

V = the true volume at the given conditions of pressure and temperature

V_i = the volume at the given pressure and temperature if the gas were ideal

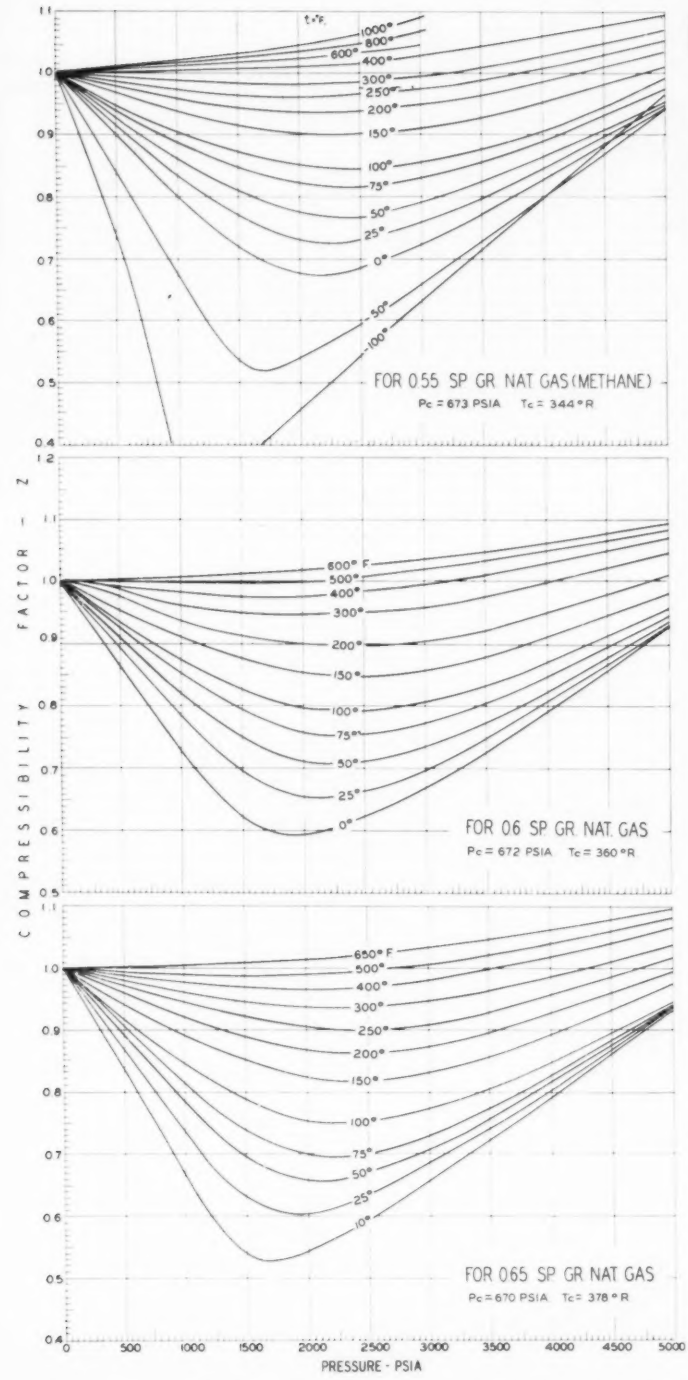
Z = the compressibility factor

The compressibility factor has been successfully correlated by means of the theorem of corresponding states using reduced pressure, P_R, and reduced temperature, T_R.

Brown[1] has shown that critical pressure and critical temperature of natural gases may be predicted from specific gravity alone without introducing serious error. This was done in the production of enthalpy-entropy charts for natural gases.

Although many charts of compressibility factor have been published, except for a few special cases such as oxygen, nitrogen, and carbon dioxide, these charts require the pressure and temperature to be expressed in terms of reduced coordinates. The operation of converting pressures and temperatures to reduced conditions is time consuming, especially when it is considered that one problem might require compressibility factors at several different conditions. It is believed that the accompanying charts will prove useful in problems dealing with the handling of natural gases. In these charts, compressibility factor is plotted against pressure for a series of temperatures and for a given specific gravity gas. The gravities pre-

*Associate professor of refining engineering, University of Tulsa.



Figs. 1-3—Compressibility factors for natural gas of 0.55, 0.60, and 0.65 specific gravity

sented are 0.55 (methane), 0.6, 0.65, 0.7, 0.8 and 0.9. Interpolation may be used between charts for other specific gravities.

The following examples will illustrate the use of these charts.

Example 1.—What is the density of a 0.7-specific gravity natural gas at 80° F. and 800 psia.? Express as pounds per cubic foot.

Solution.—Density may be calculated according to the ideal gas law by the following equation:

$$\text{Density} = 1/V = PM/RT$$

P = absolute pressure, 800 psia.
M = molecular weight, 0.7 × 29 = 20.3
R = the gas constant, 10.7
T = absolute temperature, 80 + 460 = 540° R.

Density = 800 × 20.3/540 × 10.7 = 2.8 lb. per cu. ft.

This is the density it would have if it were an ideal gas. Due to compressibility, the density will be higher.

From Fig. 4, Z = 0.835.

The true density is 2.8/0.835 = 3.36 lb. per cu. ft.

Example 2.—A natural gas with a specific gravity of 0.63 is to be stored in an underground reservoir. If the reservoir pressure is 1,000 psia. and the temperature is 120° F. how much reservoir volume is occupied by 1,000,000 standard cubic feet of gas (60° F. and 14.7 psia.)?

Solution.—The volume of 1,000,000 standard cubic feet of gas at reservoir conditions may be calculated by the ideal gas law.

$$V = 1{,}000{,}000 \cdot \left(\frac{14.7 \times 580}{1{,}000 \times 520}\right)$$

$$= 16{,}400 \text{ cu. ft.}$$

The compressibility factor must be estimated between that for a 0.6 specific gravity gas and a 0.65 specific gravity gas.

0.6 sp. gr. gas, Z = .89
0.65 sp. gr. gas, Z = .865

Interpolation between the above values gives a compressibility factor of .875 for a 0.63 specific gravity gas.

The true reservoir volume must be

$$V = 16{,}400 \times .875 = 14{,}350 \text{ cu. ft.}$$

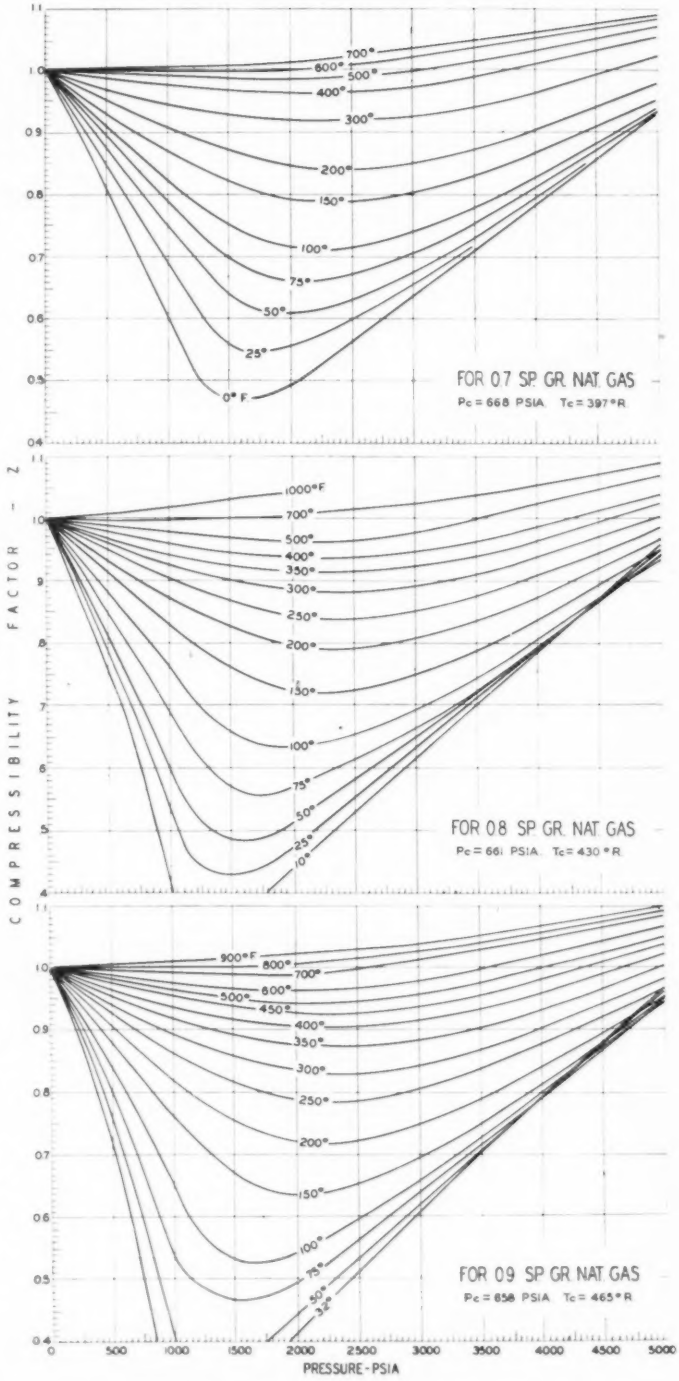
Example 3.—A compressor discharges a 0.6 specific gravity natural gas into a pipe line at 750 psia. and 90° F. If the line is a 20-in. pipe (19.375 in. i.d.) and is to handle 200,000,000 standard cubic feet per day, what is the linear velocity of the gas at the entrance to the line?

Solution.—The volume of gas at line conditions if the gas is ideal may be calculated as follows:

$$V = 200{,}000{,}000 \cdot \frac{14.7 \times 550}{750 \times 520}$$

$$= 4{,}150{,}000 \text{ cu. ft. per day}$$

(Continued on page 102)


COMPRESSIBILITY FACTOR - Z
PRESSURE - PSIA
FOR 0.7 SP. GR. NAT. GAS
Pc = 668 PSIA Tc = 397°R
FOR 0.8 SP. GR. NAT. GAS
Pc = 661 PSIA Tc = 430°R
FOR 0.9 SP. GR. NAT. GAS
Pc = 658 PSIA Tc = 465°R

Figs. 4-6—Compressibility factors for natural gas of 0.7, 0.8, and 0.9 specific gravity

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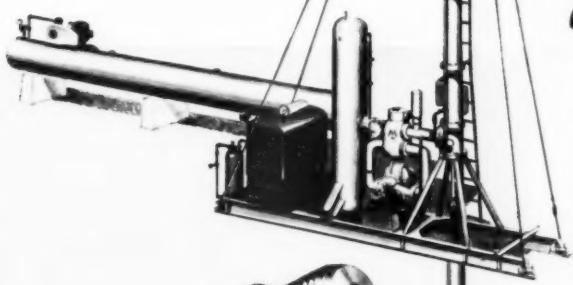
The Axelson Hydraulic Long Stroke Pumping Unit produces more oil at less lifting cost because its long smooth stroke with few stroke cycles per minute combine with easy cushioned reversals to decrease stretch loss and cut sucker rod failures to an absolute minimum. Greater pumping capacity at greater depths, together with low maintenance costs and easy operation, are proving the value of the Axelson pumping unit to oil operators throughout the nation.



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Further Field-Test Results on Use of

Corrosion Inhibitors for Secondary Flood Waters

by E. T. Heck,* J. K. Barton,† and W. E. Howell‡

IN a previous paper on this subject[1] a detailed description was given of a method for evaluating corrosion inhibitors added to secondary flooding waters. It was pointed out that several factors influence the economic picture for obtaining oil by water flooding. The type of water used, maintenance of the pipe-distribution system, and condition of the water introduced to the oil sands all have a major effect on the amount of oil recovered.

The earlier work indicated rosin amine D acetate was an effective bactericide and fungicide. In view of the fact that a number of the leases owned by Quaker State Oil Refining Co. had no type of water treatment whatever, it was decided to expand the investigation of rosin amine D acetate and similar substances to determine their effect on the growth of organisms in the water systems.

It has been recognized for some time[2,3,4] that there is a need for some type of water treatment that would reduce organic growths and at the same time eliminate corrosion. It was also felt that any material which would accomplish the foregoing purposes would automatically reduce the turbidity of the water, thus providing a more satisfactory water for flooding.

*Chief geologist, Quaker State Oil Refining Corp., Bradford, Pa.; †production engineer, Quaker State, and ‡technical service, naval stores department, Hercules Powder Co., Wilmington, Del.

Since publication of the Breston & Barton paper,[1] we have continued to expand the use of the fundamental principles they reported in an attempt to determine the value of corrosion inhibitors in the several types of water which exist in Bradford field. This variation in water type has included such things as high-dissolved oxygen, high hydrogen sulfide, high iron, and relatively high salts content, all of which have specific corrosion effects on iron pipe. It has also been the purpose of this current work to attempt to correlate the water treatment used with the effect on the oil recovery after a period of continuous feed for several months.

TABLE 1—SUMMARY OF CORROSION DATA—ROSIN AMINE D ACETATE INHIBITOR QUAKER STATE-McMANUS LEASE
(Average per cent weight loss of coupons)

	Inhibitor				
Position of coupons—	7.3 p.p.m.	3.65 p.p.m.	3.65 p.p.m.	5.9 p.p.m.	18.3 p.p.m.
After filter	5.35	5.00	5.23	5.12	1.76
High-pressure side of triplex pump	1.19	1.53	1.91	0.99	0.58
Input well W-30 (2,200 ft. from plant)	0.175	0.161	0.095	0.16	0.122

PER CENT RELATIVE CORROSION RATE
(Corrosion of coupons "after filter" = 100 per cent)

	No					
Position of coupons—	inhibitor	7.3 p.p.m.	3.65 p.p.m.	3.65 p.p.m.	5.9 p.p.m.	18.3 p.p.m.
High-pressure side of triplex pump	89.4	22.8	30.3	36.5	19.3	30.4
Input well W-30 (2,000 ft. from plant)	23.9	2.3	3.2	1.8	3.1	6.9

TABLE 2—SUMMARY OF CORROSION DATA—PUR-O-SAN INHIBITOR QUAKER STATE-McMANUS LEASE
(Average per cent weight loss of coupons)

	Inhibitor		
Position of coupons—	1.1 p.p.m.	1.1 p.p.m.	1.0 p.p.m.
After filter	2.113	2.244	2.99
High-pressure side of triplex pump	0.452	0.214	0.360
Input well W-30 (2,200 ft. from plant)	0.139	0.070	0.056

PER CENT RELATIVE CORROSION RATE
(Corrosion of coupons "after filter" = 100 per cent)

	Inhibitor		
Position of coupons—	1.1 p.p.m.	1.1 p.p.m.	1.0 p.p.m.
High-pressure side of triplex pump	21.4	9.5	12.0
Input well W-30 (2,200 ft. from plant)	6.6	3.1	1.9

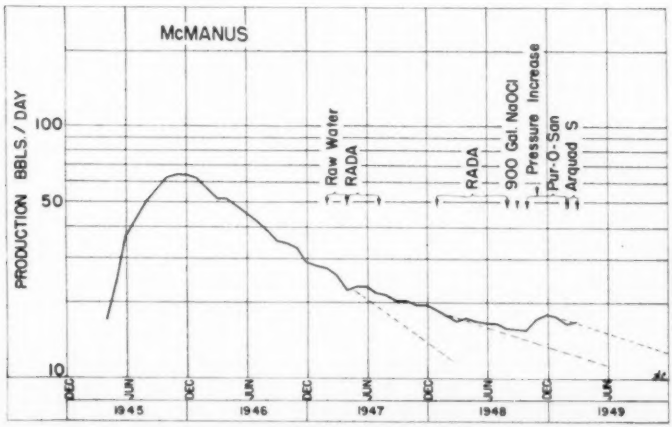

Fig. 1—Oil-production curve showing changes which occurred during 16-month treating period, McManus lease

During 1948 several field tests were made using water-soluble salt of a modified rosin amine, supplied as a 70 per cent solids paste, manufactured by Hercules Powder Co., Wilmington. Late in 1948, evaluation was begun on Pur-O-San, a quaternary ammonium salt supplied as a 10 per cent solution in water and made by Pur-O-San Co., Bradford, Pa. Early in 1949, Arquad S, a soybean trimethyl ammonium chloride in paste form (33 per cent) made by Armour & Co., was introduced for field testing.

As far as possible the concentrations used for the tests with Pur-O-San and Arquad S were predicated on equaling the cost of similar treatment using rosin amine D acetate.

Briefly, the method consisted of dissolving the inhibitor in a calculated amount of water in a cylindrical stock-solution tank. This tank delivers into a chemical feed pump which in turn feeds into the main water-supply line

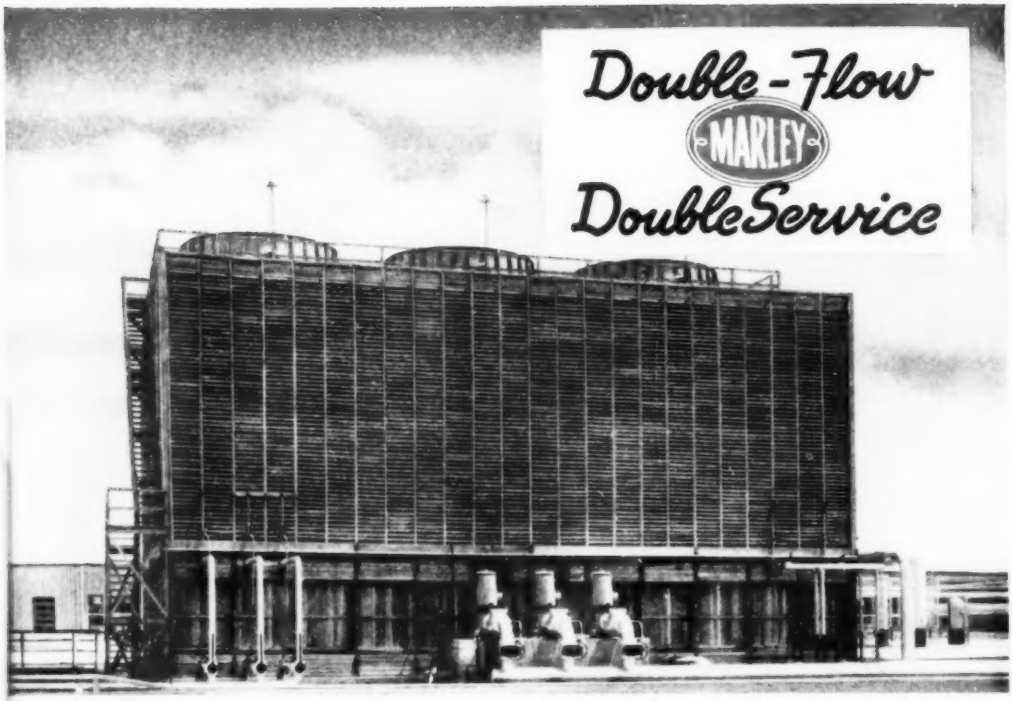

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Photo by Elwood Payne

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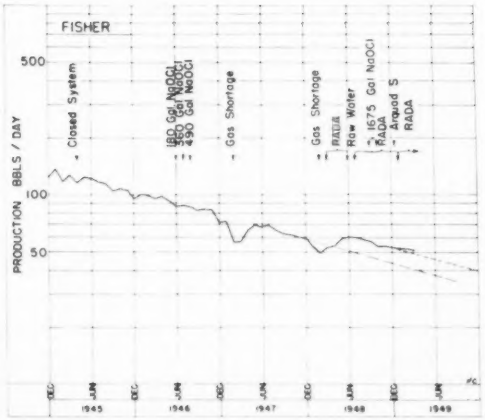


Fig. 2—Decline curve on Fisher lease

on the intake side of the high-pressure pumps.

Holders for steel coupons used for measuring weight loss (corrosion) are installed at three locations: (1) on the discharge side of the water-supply filter, if any, (2) on the discharge side of the pump several feet from the point of addition of the chemical feed pump, and (3) in a bypass arrangement located at the end of one of the water-distribution lines. It should be pointed out that the amount of water passing over the coupons at location (3) is only a small fraction of that passing over the plates at points (1) and (2).

After a 6-week period, the loss in weight of the coupons is measured, and considering the corrosion loss of plates in the untreated water as 100 per cent, the relative per cent corrosion at the other two locations can be computed. By subtracting the relative corrosion values from 100, the per cent protection is obtained.

TABLE 6—WATER ANALYSIS—DALY LEASE

	Supply well	End of line
Temperature, F	53	55
pH	7.6	7.5
Free carbon dioxide (as free CO_2), p.p.m.	4	5
Dissolved oxygen (O)	10.3	7.8
Sulfates (SO_4)	4	4
Total dissolved iron (as Fe)	0.2	0.2
Chlorides (as Cl)	118	118
Hardness (as $CaCO_3$)	120	120
Calcium (as $CaCO_3$)	87	89
Hydrogen sulfide (as H_2S)	0	0
Alkalinity (as $CaCO_3$)	156	156

Because of the wide variation in the composition of the water used for flooding, the preparation of solutions of rosin amine D acetate has at times given some trouble. Tests at the Hercules experiment station indicated that a critical solubility range existed between 0.01 per cent and about 1 per cent in which solutions varied from hazy to a milky appearance. By avoiding this range in the stock solution tanks, most of the difficulty of preparing stock solutions has been overcome.

TABLE 7—SUMMARY OF CORROSION DATA—ROSIN AMINE D ACETATE INHIBITOR QUAKER STATE-DALY LEASE

(Average per cent weight loss of coupons)

	R.A.D.A. — 10 p.p.m.		
Position of coupons—	Acid = pH 5.0 (per cent)	Acid = pH 4.0 (per cent)	No acid (per cent)
Intake	2.66	5.94	1.14
Discharge	4.63	15.90	0.13
Well 013	2.07	3.61	0.40

PER CENT RELATIVE CORROSION RATE

(Corrosion of coupons at "intake" = 100 per cent)

	R.A.D.A. — 10 p.p.m.		
Position of coupons—	Acid = pH 5.0 (per cent)	Acid = pH 4.0 (per cent)	No acid (per cent)
Discharge	174	268	11.4
Well 013	77.8	60.8	35.0

TABLE 3—SUMMARY OF CORROSION DATA—ARQUAD S INHIBITOR QUAKER STATE-McMANUS LEASE

	Average per cent weight loss of coupons	Per cent relative corrosion
Position of coupons—	Inhibitor = 3.33 p.p.m.	3.33 p.p.m.
After filter	6.906	100
High-pressure side of triplex pump	2.286	33.1
Input well W-30 (2,200 ft. from plant)	0.129	1.86

TABLE 4—SUMMARY OF CORROSION DATA—ROSIN AMINE D ACETATE INHIBITOR QUAKER STATE-FISHER LEASE

(Average per cent weight loss of coupons)

Position of coupons—	No inhibitor	7.3 p.p.m.	10 p.p.m.	10 p.p.m.
Intake	0.523	0.373	0.44	0.690
Discharge No. 1	pump not running	0.236	1.30	0.865
Discharge No. 2	0.0925	0.148	4.94	part time only
Well 0146	0.088	0.033	0.03	0.15

PER CENT RELATIVE CORROSION RATE

(Corrosion of coupons at "intake" = 100 per cent)

Position of coupons—	No inhibitor	7.3 p.p.m.	10 p.p.m.	10 p.p.m.
Discharge No. 1		63.3	295	125
Discharge No. 2	17.7	39.7	1,120	
Well 0146	16.8	8.8	6.8	21.7

TABLE 5—WATER ANALYSIS—QUAKER STATE-FISHER LEASE

	Supply well	At well 0146
Appearance when sampled	Clear	Clear
Appearance after standing	Clear	Red
Odor	Rancid	Gaseous
Taste	Sulfur	N.D.
pH	6.4	6.6
Free carbon dioxide (as free CO_2), p.p.m.	42	42
Dissolved oxygen (O)	0	0
Sulfates (SO_4)	24	24
Total dissolved iron (as Fe)	2.0	12.0
Chlorides (Cl)	174	184
Hardness (as $CaCO_3$)	148	156
Calcium (as $CaCO_3$)	105	105
Hydrogen sulfide (as H_2S)	0.627	2.233
Alkalinity (as $CaCO_3$)	90	108

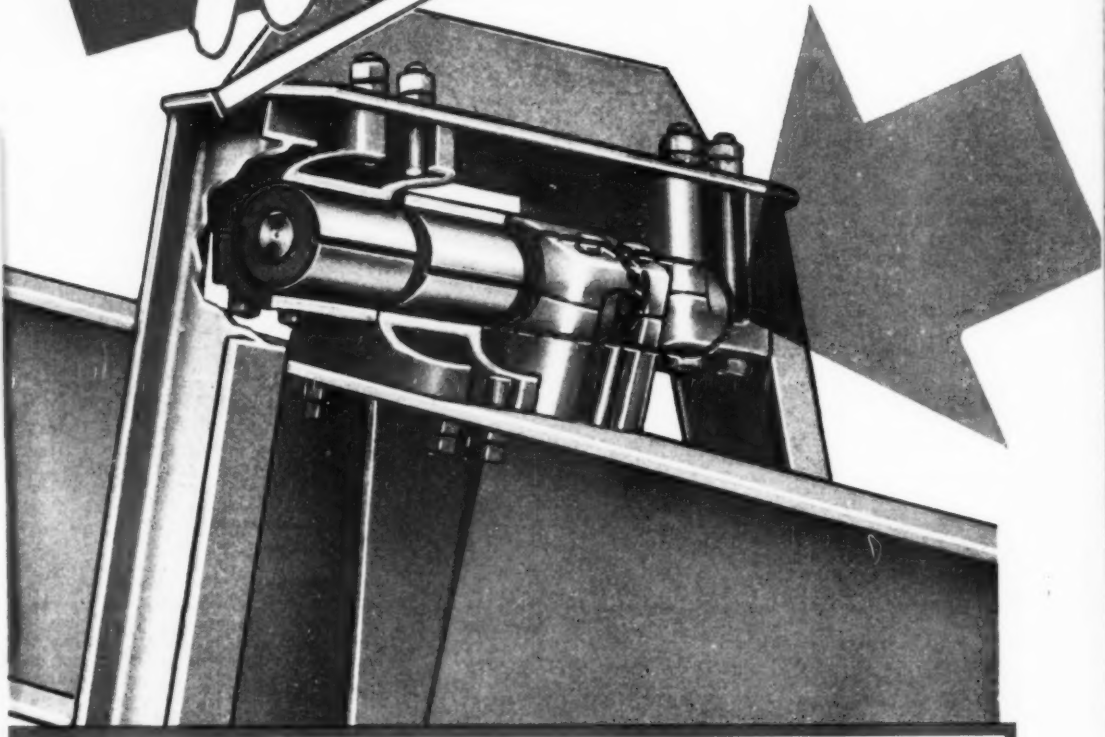
The presence of sulfate ion in the water used for preparing stock solutions has been known to cause precipitation of rosin amine D acetate to form a milky solution, but apparently after injection and dilution to concentrations used the suspended matter is redissolved, as there is no evidence of any precipitate in the water at the end of the distribution lines. It was also found by experimentation in the field that the use of a small amount of heat applied continuously to the stock-solution tank helps to alleviate solution difficulties, particularly during the colder winter months. In making solutions of the other two products tested, it was found that Pur-O-San readily dissolved in lease waters without heat, but Arquad S also required heat.

Field Tests

To facilitate discussion of the test data our program will be considered by individual leases, followed by some conclusions based on the results obtained to date.

McManus lease.—This property was used for the original field test on

The New CABOT



Cabot Equalastic Bearing Tested Thoroughly and Completely

In 1946 Cabot Shops, Inc. and the United States Rubber Company began work jointly on the Equalastic Evener Bearing. After much research and testing, several bearings were made and installed on units actually operating in the field, and on a laboratory testing machine. (See illustration). This machine, operating at three times normal pumping unit speed in an extremely unbalanced condition, practically broke itself up but failed to damage the Equalastic Bearing! Likewise, field reports not only showed that the Equalastic Bearing passed every test with flying colors but also reduced wear and maintenance on the other components of the pumping unit.

Equalastic Bearing Cuts Production Costs

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- ★ No Moving Parts
- ★ No Rubbing Surfaces
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Substitutes torsion within rubber bushings for conventional bearings. It is that simple!

Dynagraph tests prove that maximum polish rod load is reduced.

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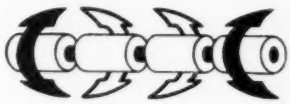
The revolutionary new Cabot Equalastic Evener Bearing (patented) consists of four special rubber cylinders vulcanized on a shaft. Each cylinder has a thin split metal shell vulcanized to the exterior surface.



As shown in the diagram the two outside rubber bearings are clamped to the pitman in large steel castings. The two inside bearings are secured in the same manner to the beam.

All angular motion between the pitman and the beam is taken within these rubber bearings.

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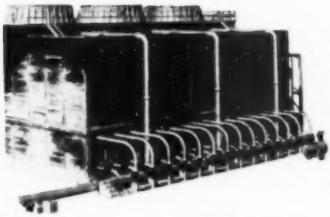

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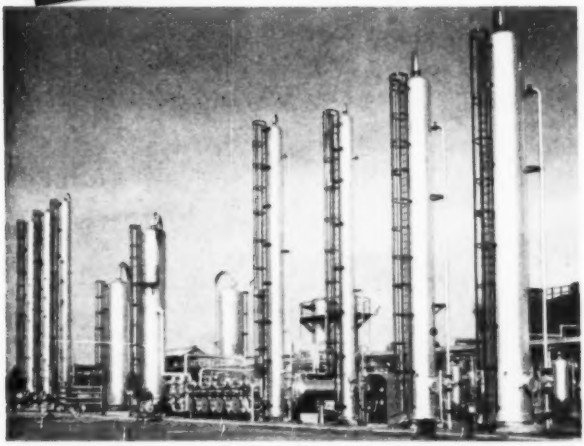

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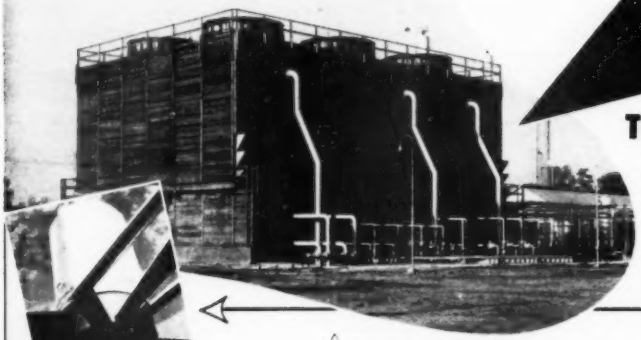

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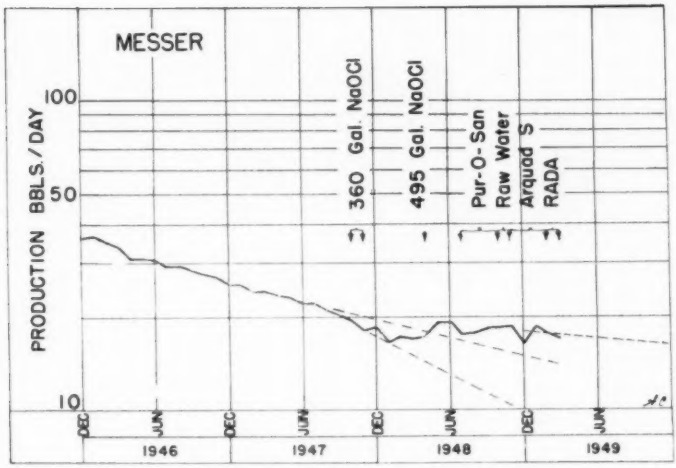

Fig. 3—Messer lease, decline curve

use of rosin amine D acetate because of the low pH (6.0-6.5) water supply. Following a series of 6-week tests, a long-range test was also run on this lease. A summary of the corrosion data on these runs appears in Table 1. For comparison, previous values for per cent relative corrosion using no inhibitor have been included. It will also be noted that the test using 18.3 p.p.m. rosin amine D acetate does not correlate well with the values obtained at lower inhibitor addition rates. On removing the control coupons at the conclusion of this test, it was noted that they were coated with a thin film, indicating that during a pump shutdown some of the treated water may have backed up over the control plates. If these coupons had shown the usual loss of around 5.0 per cent in weight, the relative corrosion values for the other two locations would have calculated to 9.0 and 2.8 per cent.

The amount of maintenance required on the water-distribution lines during this series of tests with rosin amine D acetate was less than that formerly experienced. In addition to this improvement in the number of leaks reported, it was also evident that the quality of the water was greatly improved. Prior to this test it was known that rosin amine D acetate is an effective fungicide and algaecide, so it was decided to follow this function by a series of weekly samples for bacteria counts based on a 48-hour incubation period. Bacteria analyses were performed by the Health Laboratory at Bradford. Plates were cultured at 37° C. under aerobic condition, after which the colonies were counted in a sample representing 1 cc. of the test solution.

With the exception of an occasional peak, presumably caused by contamination of the sample, the inhibitors used were effective in maintaining control of the bacterial growth. Visual observation of the water at the end of the distribution line and that backflowed from the well also indicated complete elimination of so-called "black bacteria" which are the anaerobic, sulfate-reducing type.

Chronologically, at the conclusion of the 7-month rosin amine D acetate test (10 p.p.m.—no coupons) it was decided to try a sodium hypochlorite feed (100 p.p.m.) on this lease, and this was continued for 22 days. Twenty-seven days later a series of three 6-week runs were made using Pur-O-San. On an active-ingredient basis 1 p.p.m. was used for these tests. A summary of the results obtained is given in Table 2. In general, Pur-O-San treatment showed excellent corrosion protection and bacteria control throughout the tests on this lease.

To complete our survey of inhibitors on the McManus lease, Arquad S was tested at an active ingredient concentration of 3.33 p.p.m. Although the inhibition at the discharge side of the high-pressure pumps was not quite as effective as that obtained with the other inhibitors, excellent protection was achieved out at the end of the distribution lines and bacterial control was satisfactory. Corrosion data are given in Table 3.

TABLE 8—WATER ANALYSIS—MESSER LEASE

	Supply well	End of line
Temperature, °F.	58	56
pH	7.5	7.5
Free carbon dioxide (as free CO_2), p.p.m.	4	4
Dissolved oxygen (O)	0.06	0.12
Sulfates (SO_4)	4	4
Total dissolved iron (as Fe)	0.5	1.75
Chlorides (as Cl)	204	206
Hardness (as $CaCO_3$)	70	72
Calcium (as $CaCO_3$)	59	61
Hydrogen sulfide (as H_2S	0.15	N.D.
Alkalinity (as $CaCO_3$)	164	164

The changes which occurred on the oil-production curve for this lease during the 16-month period of treatment are illustrated by the curve, Fig. 1. The original predicted-decline curve is indicated along with production obtained during the test periods. In considering the decline curve for this lease, it is well to bear in mind that, within the practical limits of meter operation, there was little or no change in water intake rates.

Fisher lease.—This lease was selected for treatment with rosin amine D acetate early in 1948 because of hydrogen sulfide present in the water being used. A typical analysis of the water-supply well and at the end of one of the distribution lines is shown in Table 5. Before treatment was used the condition of the line water and the backflow water was examined visually. Severe turbidity was indicated with a wide range of colors, from white to jet black. The incidence of leaks requiring repairs was also very high on this lease.

Based on our experience with the McManus lease, corrosion test coupons were inserted in the lines and bacteria samples were taken periodically. A summary of corrosion coupon

TABLE 10—WATER ANALYSIS—QUAKER STATE-DEMPS LEASE

	Supply well	End of line
Temperature, °F.	49	49
pH	7.0	7.1
Free carbon dioxide (as free CO_2)	13	12
Dissolved oxygen (O)	0.07	0
Sulfates (SO_4)	4	4
Total dissolved iron (as Fe)	1.4	3.5
Chlorides (as Cl)	338	336
Hardness (as $CaCO_3$)	248	248
Calcium (as $CaCO_3$)	209	223
Hydrogen sulfide (as H_2S)	0.64	0.86
Alkalinity (as $CaCO_3$)	98	100

TABLE 9—SUMMARY OF CORROSION DATA—MESSER LEASE
(Average per cent weight loss of coupons)

	Pur-O-San		Arquad S		R.A.D.A.
Position of coupons—	0.6 p.p.m.	1 p.p.m.	10 p.p.m.	20 p.p.m.	10 p.p.m.
Intake	0.501	0.109	0.139	0.286	0.135
Discharge	0.485	0.063	0.169	0.309	0.207
Well 011	0.038	0.052	0.044	0.041	0.020

PER CENT RELATIVE CORROSION RATE
(Corrosion of coupons at "intake" = 100 per cent)

	Pur-O-San		Arquad S		R.A.D.A.
Position of coupons—	0.6 p.p.m.	1 p.p.m.	10 p.p.m.	20 p.p.m.	10 p.p.m.
Discharge	96.8	57.8	121	108	154
Well 011	7.6	47.7	31.6	14.3	14.8

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data is given in Table 4. We are unable to do more than theorize on the wide variation shown by the corrosion coupon data, particularly in view of the excellent results which have been experienced on this lease. It is thought that possibly the H_2S gas in the intake water on going through the high-pressure pumps caused a localized highly corrosive condition where the test coupons were located. The fact that corrosion protection at the end of the distribution line at well No. 0146 was more or less normal would seem to indicate such a condition, but it must also be stated that no other evidence of severe corrosion has become apparent at the discharge side of the pumps.

As mentioned above, the beneficial results of the rosin amine D acetate treatment were observed very shortly after its introduction. Visual examination of the backflow and line flow has shown complete elimination of any suspended matter. Likewise, over a 14-month period the incidence of leaks on this lease has dropped almost to zero, whereas prior to the use of the amine treatment an average of 12 leaks per month were reported. In view of the severer disruption of pressure caused by leaks in distribution lines, and the undesirable presence of suspended matter in the flooding water, the marked improvement in these factors alone has more than justified the treatment used.

As an additional experiment the rosin amine D acetate feed on this lease was discontinued on January 7, 1949. Four days later the distribution-line water and the backflow were both black in color, indicating a return to a corrosive condition caused by black bacteria. For the following 6 days 3.3 p.p.m. of Arquad S was injected into the distribution lines. Almost complete control was obtained as evidenced by reducing the black water to a light gray and lowering of the bacteria-count analyses. This lease has since been operated with rosin amine D acetate at a rate of 10 p.p.m. with satisfactory results. The decline curve on this lease is shown in Fig. 2.

TABLE 13—WATER ANALYSIS—QUAKER STATE-SIMS LEASE—PLANT NO. 2

	Supply well	End of line
Temperature, °F.	58	62
pH	7.3	7.3
Free carbon dioxide (as free CO_2), p.p.m.	13	11
Dissolved oxygen (O)	2.17	1.58
Sulfates (SO_4)	24	24
Total dissolved iron (as Fe)	0.1	0.2
Chlorides (as Cl)	22	22
Hardness (as $CaCO_3$)	196	196
Calcium (as $CaCO_3$)	164	164
Hydrogen sulfide (as H_2S)	0	0
Alkalinity (as $CaCO_3$)	180	180

Daly lease.—At the time this lease was selected for testing it had almost reached its economic limit. The purpose behind the test on this lease was to attempt to substantiate a theory that flooding with a water of pH 3.0 to 5.0 would allow opening up the sand, increase intake rates, and thereby result in increased production. It was felt that if a low pH water could be used along with an inhibitor to prevent damage to pumps and distribution lines, a considerable increase in production could result.

Typical analysis of the water on the Daly lease is given in Table 6. Heavy algae growth was present in the supply tank on this air-lift water. Hydrochloric acid was used to adjust the pH to the desired level with the addition of 10 p.p.m. rosin amine D acetate in the usual manner. Corrosion coupon data, Table 7, and bacteria counts show almost complete lack of control of both factors on this test. The pH was held below 3.6 from June 23 to July 10 and actually dropped below 3 on June 30. The fact that bacteria flourished at the low pH was quite a surprise.

Some degree of bacterial control developed after the acid feed was discontinued on July 18, 1948. It is also evident from the data that reasonably good corrosion protection, particularly at the discharge location, developed after the acid feed was discontinued. It is possible that an increase in the amount of inhibitor used might have changed the course of this development. Another possibility is that the concentration of acid was sufficient to cause formation of the water-insoluble hydrochloride of rosin amine D, thus preventing the usual deposition of a film of the inhibitor. Further work on the use of inhibitors in subnormal pH water remains to be done.

Messer lease.—This property is operated on filtered well water at a pressure of 1,300 psig. Without any treatment the water at the end of the distribution lines is slightly red in color and the backflow water runs black. For this reason this lease was considered a good place to evaluate all three inhibitors. A typical analysis of this lease water is given in Table 8.

As a pretreatment this lease was given a hypochlorite feed of 100 p.p.m. for 31 days. In successive 6-week periods, two runs have been made using Pur-O-San, two runs with Arquad S, and a single run with rosin amine D acetate. During the second Pur-O-San treatment it was found that pump speeds had to be increased, indicating improvement in intake rates. A further increase in pump speeds has been necessary during the Arquad S and rosin amine D acetate treatment periods. It is estimated that an increase of about 20 per cent in the amount of water being supplied to the intake wells has been realized. It has also been reported that the condition of the water at the end of the line during the Pur-O-San treatment was clear; during the Arquad S treatment the water had a slight grayish cast and after 1 week of rosin amine D acetate feed, a crystal-clear effluent was being obtained.

In analyzing the results of corrosion tests as given in Table 9 it should be noted that the results on Arquad S and rosin amine D acetate are not in agreement with previous experience. During the cleaning of the test plates after exposure a characteristic film was noticed, indicating that evidently some of the inhibitor had backed up over the "intake" plates. Such a condition will occur where lease water pumps depend on variable gas supply.

TABLE 11—SUMMARY OF CORROSION DATA—QUAKER STATE-DEMPS LEASE
(Average per cent weight loss of coupons)

Position of coupons—	Formaldehyde 20 p.p.m. (per cent)	Hypochlorite 15 p.p.m. R.A.D.A. 10 p.p.m. (per cent)	No hypochlorite R.A.D.A. = 10 p.p.m. (per cent)
Intake	1.53	7.73	3.53
Discharge No. 1	*1.16	*0.32	0.07
Discharge No. 2	*0.79	†3.32	1.42
Well 037	0.07	0.28	0.06

PER CENT RELATIVE CORROSION RATE
(Corrosion of "intake" coupons = 100 per cent)

Position of coupons—	Formaldehyde 20 p.p.m. (per cent)	Hypochlorite 15 p.p.m. R.A.D.A. 10 p.p.m. (per cent)	No hypochlorite R.A.D.A. = 10 p.p.m. (per cent)
Discharge No. 1	75.8	4.14	1.98
Discharge No. 2	51.6	43.0	40.2
Well 037	4.6	3.62	1.70

*Treated. †Untreated.

TABLE 12—SUMMARY OF CORROSION DATA—ROSIN AMINE D ACETATE INHIBITOR QUAKER STATE-SIMS LEASE—PLANT NO. 2
(Average per cent)

Position of coupons—	Weight loss of coupons— Inhibitor = None	R.A.D.A. 10 p.p.m.	Per cent relative corrosion rate R.A.D.A. 10 p.p.m.
Intake	1.44	2.20-2.41	100-100
Discharge	1.29	0.46-0.826	20.9-34.2
Well 030	0.68	0.36-0.592	16.1-24.5

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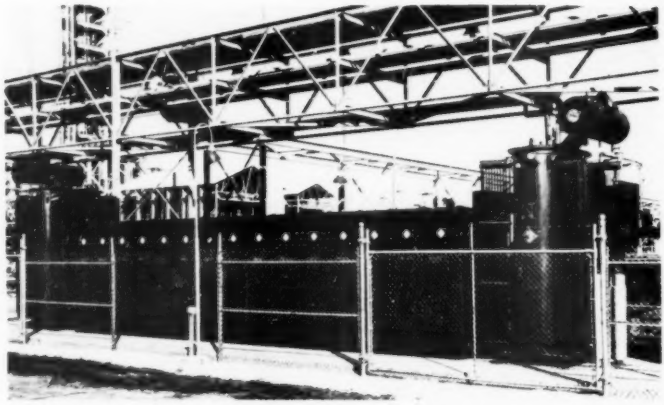

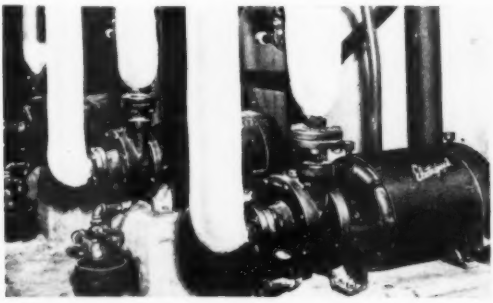

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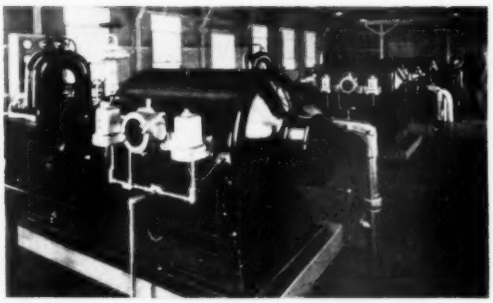

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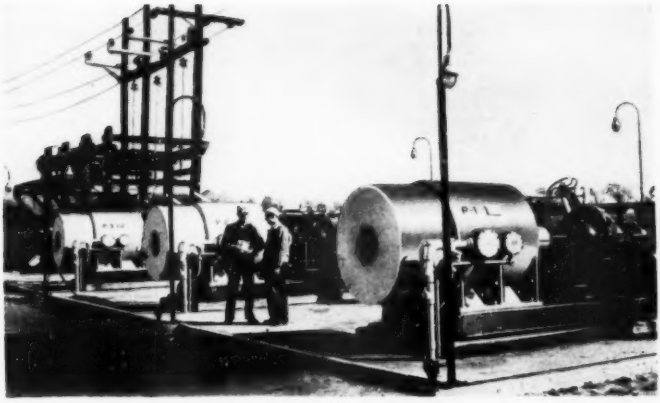

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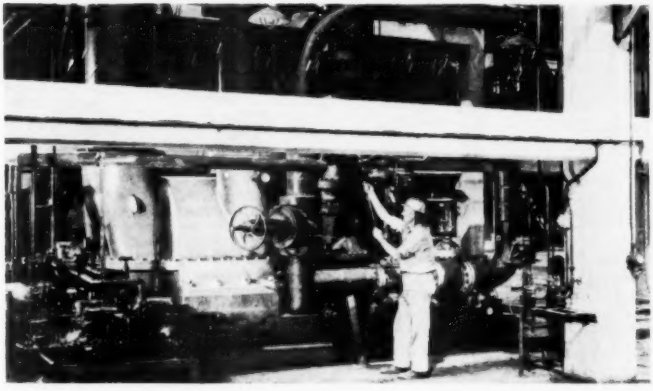

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When this gas becomes short, it is necessary to shut down the pumps, but the chemical feed pumps, being electrically driven, continue to operate.

The increased volume of water for flooding this lease resulting from introduction of all three inhibitors is reflected in the decline curve shown in Fig. 3.

Demps lease.—A corrosive water supply used for flooding this lease had led the Quaker State management to install a sodium hypochlorite feed system to the supply well. At an injection rate of 15 p.p.m. sodium hypochlorite (available chlorine) most of the sulfur was removed, but the water still remained corrosive. A typical analysis of the water is given in Table 10. Prior to treatment of the flood water with rosin amone D acetate a 6-week test run was made using formaldehyde at about 20 p.p.m. Corrosion protection afforded by the formaldehyde treatment was considerably lower than desired, as shown in Table 11.

The results of tests made using rosin amine D acetate with or without a hypochlorite feed ahead of the filter indicate a very good degree of corrosion protection was obtained. It should be noted that this lease is equipped with two high-pressure pumps and the test procedure was so arranged that corrosion coupons were located at the discharge of each pump, but only one set was used in water treated with rosin amine D acetate.

The incidence of leaks in the distribution system on this lease has shown a substantial improvement over the 9 months that rosin amine D acetate has been used for water treatment. Early in 1948, an average of 13 leaks per month was considered normal on this lease. In recent months the average has dropped to four and the lease foremen report that the frequency is still dropping. Here again, a well-defined improvement has been experienced in the visual turbidity of the line and backflow waters.

A production curve for the Demps is not included because a portion of this lease has been under development for the past year, and the increased oil production from the added property makes any other observations impractical.

Sims lease—Plant No. 2.—A series of tests on this property was begun in November 1947, at which time a raw-water test indicated corrosion and the water at both the end of the distribution line and on backflowing was black. Actual feed of rosin amine D acetate was not instigated until December 1948. Good corrosion protection, based on loss weight of coupons (Table 12), was achieved and a remarkable improvement in the appearance of the water has been obtained. Water used for flooding this lease is purchased from a local water-supply company and contains up to 4 p.p.m. of dissolved oxygen. A typical analysis of this water is given in Table 13. In general the corrosion protection was satisfactory, but on the basis of this run it was not quite as effective as that obtained on the Demps lease, for example.

Conclusions

1. Field tests indicate all three materials give satisfactory control of organic growth in most waters. This control is evident in the backflow as well as in the surface distribution lines.

2. Although some of the data are conflicting, it appears that rosin amine D acetate and Pur-O-San were effective in controlling corrosion. Judging from leak reports and bacteria tests, rosin amine D acetate is effective in water containing hydrogen sulfide. The results obtained with rosin amine D acetate on water containing dissolved oxygen showed a good degree of protection, though not as great as in oxygen-free water. The other materials (Pur-O-San and Arquad S) have not yet been tested under the latter condition.

3. Although no attempt was made to measure turbidity quantitatively, it was evident that a marked decrease was obtained with all three inhibitors tested. The effect was most striking on the Fisher and Demps leases where the water contained hydrogen sulfide.

4. We have purposely made no interpretation of the effect of inhibitors on the oil-production curves. The curves seem to illustrate, however, that no unfavorable results were experienced.

5. On some leases there was a noticeable decrease in the amount of water passing through the pressure plant after beginning to use inhibitors. In cases where the feed of inhibitor was continued for an appreciable time, we have been able to establish that not only was there no decrease in intake rates, but there is a definite indication of a mild increase.

Acknowledgments

1. The writers wish to thank Miss Ruby Hostetler of the Health Laboratory, Bradford, for valuable assistance in connection with the bacteria counts on water samples.

2. Test plate coupon weights in part were determined by Bradford Laboratories, Inc., Bradford.

3. For assembly of the data presented in this paper, for field supervision of tests, for collection of bacteria samples, and for lease water analyses, special credit is due G. F. Brown, J. W. Ferry, and C. G. Purse, Jr., of Quaker State Oil Refining Corp., engineering department.

4. We wish to thank J. P. Healy, general manager of the production unit, Quaker State Oil Refining Corp., for permission to publish these results.

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Tide Water's Bottom-Hole Pressure 12,635 Psi.

(Continued from page 59)

Mud with low water loss of 2 to 4 cc. and high pH of 12.5 to 13.0 was used in drilling the well. Mud weight varied from 12.5 to 18.8 lb. per gallon while drilling was done from the bottom of the 7-in. casing to total depth.

There were no fishing jobs and the major difficulty encountered was lost circulation while completing the well. Both electrical and gamma-ray logs were run. Reciprocating scratchers were placed every 15 ft. on the casing, with centralizers every 90 ft. It is interesting to note the close tolerance between the 7-in. casing and the $8\frac{5}{8}$-in. hole drilled below the $9\frac{5}{8}$-in. casing.

As a matter of interest, the 7-in. casing string was set at 12,480 ft. with 1,000 sacks of cement, and a temperature survey run to locate the top of the cement behind the casing. This survey indicated the top to be at 9,825 ft., some 2,655 ft. above the bottom of the 7-in.

As shown in the accompanying pictures, the well location was in water. All men, materials, and equipment had to be moved 12 miles from the nearest boat landing to the location. Marine radio telephone was used to provide communication with shore.

To protect the well, piling was driven around the location. (See picture). The location is on a heavily traveled shipping route from New Orleans to Grand Isle, and a stray or lost craft during storms or heavy seasonal fogs could easily wreck havoc with an unprotected christmas tree.

The well was drilled under the supervision of J. A. Smotherman, Tide Water district superintendent; E. R. Senac, Jr., district engineer, and James F. Eggleston, district foreman, all of Harvey, La. J. E. Bailey, assistant division superintendent in Houston, was on the rig during the completion phase of the operation. Rowan Drilling Co., Inc., drilled the well, with W. E. Wysick as tool pusher.

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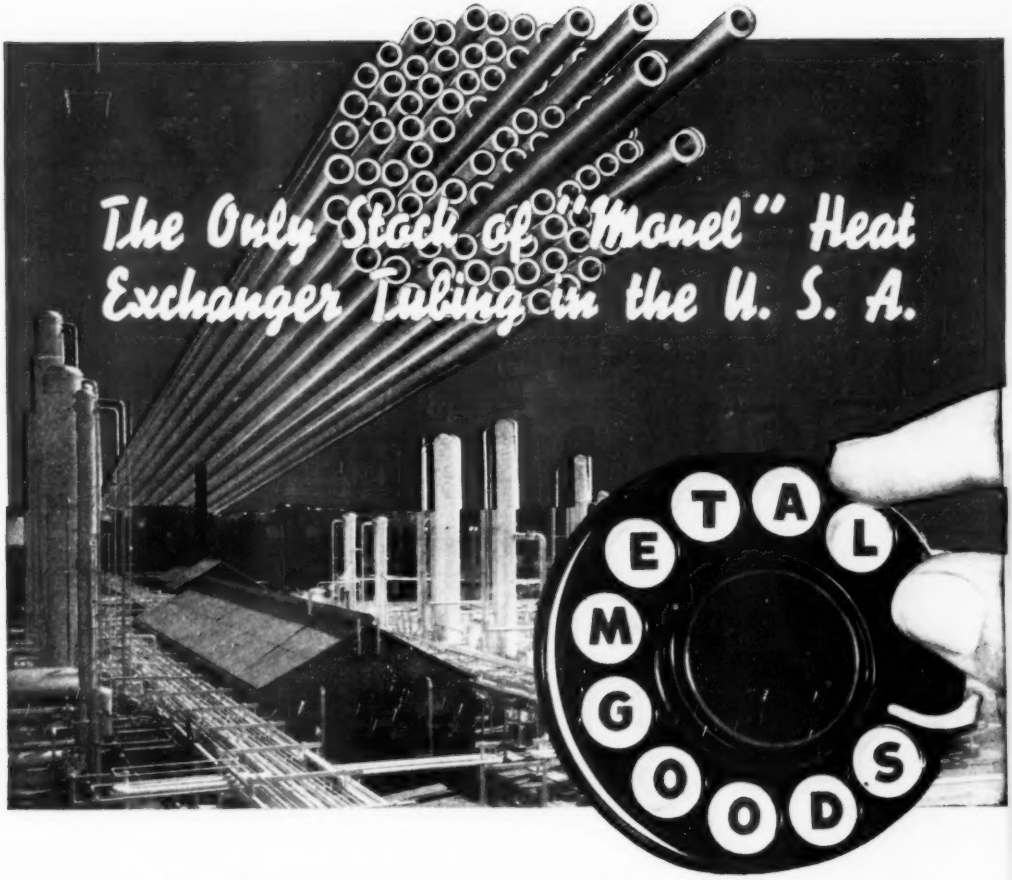

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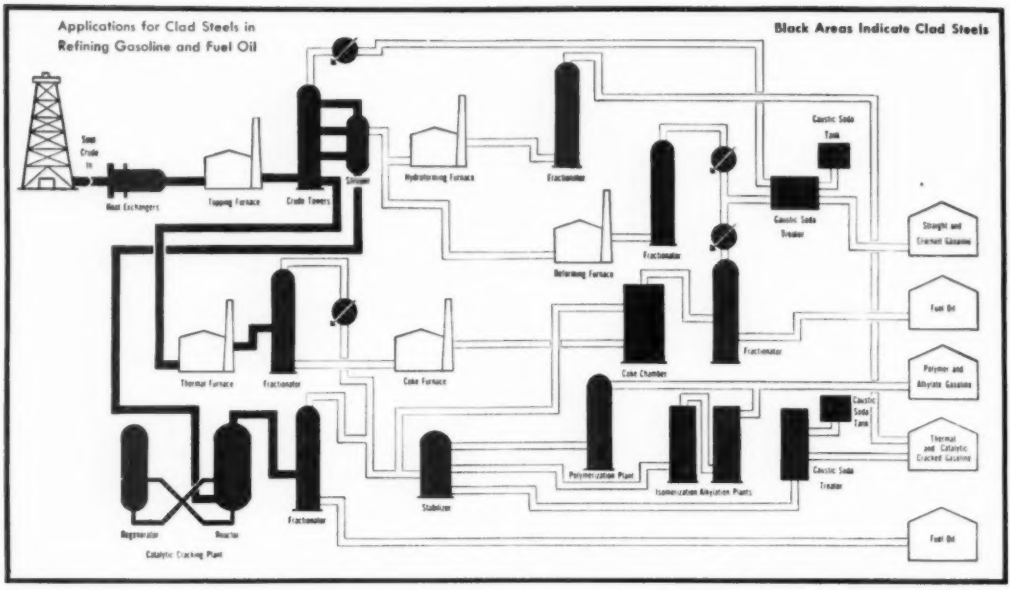

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Effect of Sulfur on the Quality of Steels

DESPITE the fact that the problem has long existed, the effect of sulfur on the quality and end uses of steel products has never been clearly resolved. M. Tenenbaum in his paper, "Effect of Sulfur on Quality and End Uses of Steel Products," presented before the general meeting of the American Iron and Steel Institute, May 1949, has surveyed various steel products with respect to sulfur limits needed to meet quality requirements and has indicated the manner in which the influence of sulfur is felt. In the evaluation of product quality, consideration was given to both rolling surface requirements and to the specific properties demanded for each end use.

The data on which the paper is based were obtained from 26 steel plants. A table is given showing the average maximum sulfur requirement for each grade and product considered, together with the property most generally conceded to be responsible for this sulfur limit and the average maximum sulfur specified to steel making furnaces. With the exception of drawing quality cold-rolled sheets, welding quality rod, and a single special high-tensile grade, the maximum sulfurs on the plain carbon grades required to meet surface and rolling requirements within the plant itself are lower than the values needed for the various end uses.

Effect of Small Variations

From other data obtained, it appears that small variations in sulfur content can and probably do exert a significant effect on product quality. The small variations in specified values often can hardly be justified on the basis of the apparently limited information available regarding the effect of sulfur on quality. The confused situation in which the effect of small sulfur variations does not seem satisfactorily defined is particularly pronounced in the case of the commercially important steels for deep-drawing applications.

Unquestionably, further work is necessary to establish the effect of sulfur on hardness, ductility, and product performance of the deep-drawing steels. Because of the high cost associated with the elimination of a few thousandths of a per cent of sulfur as the specified limit for deep-drawing steels is approached, logical and reliable data should be sought on which to establish specification. Such reliable information could then be used either to allow some relaxation of the present rigid sulfur limits or to justify the higher steel-making problems that would be involved in meeting even lower sulfur limits.

The data relating sulfur to quality variables and the number of steels surveyed are obviously limited. The data can be used, however, to demonstrate the general nature of present knowledge regarding this pertinent and practical problem, and also can serve as a basis for directing future experimental investigations into the true role of sulfur in the metallurgy of steel.

An abstract taken from the July issue of Materials and Methods.

Aluminum Clad Steels

THE combination of aluminum on steel is advantageous in many applications where special performance requirements must be met. One of the critical factors is, of course, the bonding strength, and V. W. Cooke and A. Levy discussed this in their paper, "Solid Phase Bonding of Aluminum to Steel," presented before the Institute of Metals, division of the A.I.M.E. at the April 22 regional conference in Springfield, Mass. They pointed out that one of the chief precautions to a successful bond was to avoid a heavy oxide coating on the ferrous material. This could be done by using stainless steel or chromium plating the low-alloy steels. After bonding, a full solution treatment for the aluminum alloy is not permitted since this combination of time and temperature permitted enough diffusion to build up a sufficient thick intermetallic compound layer to be brittle. Bond strengths of from 20,000 to 50,000 psi. were possible, and bonding could be accomplished at as low a temperature as 550 F. where little upsetting under the pressures used was noted.

Prewar Production in Germany

In Germany prior to the war, aluminum-clad steel was produced in appreciable quantities, amounting to about 500 tons per month, according to an article appearing in Metallurgia (English), May 1949. The material was marketed under the name of Feran and was used largely for such products as diaphragms for telephones, windings for flexible piping, and bands for electric cables used in heating equipment.

The method of manufacture briefly consists of a mechanical cladding operation followed by a thermal treatment so as to alloy the steel and aluminum in an intimate manner. The steel used was of deep drawing quality with the following composition: 0.06 per cent carbon, 0.04 per cent sulfur, 0.04 per cent phosphorus, 0.6 per cent manganese, and traces of silicon. The aluminum used contained from 0.6 to 1 per cent silicon, and 0.35 per cent iron. The aluminum was cold rolled down to about 0.008 in., heat treated in coiled bands, rough brushed, and then coiled on special holders. It was then rolled-laminated with the steel.

The lamination must be done with the maximum possible elongation, and reduction in one pass is at least a minimun of 40 per cent. The temperature required for a good lamination ranged from about 210° to 390° F. After the laminating, the material is further cold rolled to the final thickness. The laminated strip is then heat treated at a temperature varying between 995° and 1,020° F.

Abstracts taken from the July 1949 issue of Materials and Methods.

Resisting Merceptan Sulfur And Caustic Soda

IN several modern sweetening or mercaptan-removal processes, caustic soda (perhaps with solutizer agents) is currently regenerated by boiling it and stripping it with steam. The foul mercaptan-laden solution is corrosive to carbon steel. Lukens Steel Co., in its Clad News (Vol. 10, No. 1) reports that monel-clad and nickel-clad steels are quite resistant.

In one caustic-regeneration plant the foul caustic was handled in a reboiler which had monel-metal tubes and nickel-clad tube sheets. Steam on the outside of the tubes maintains the temperature at 150° to 350° F. This installation has been in operation since April 1942 whereas the original installation lasted only 5 months.

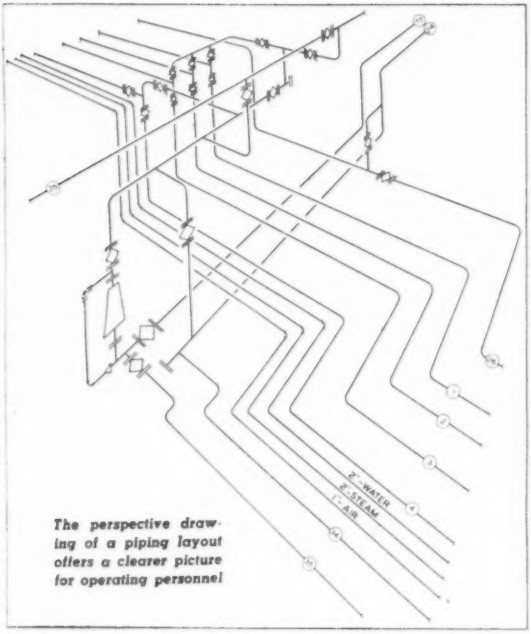
Another plant which employed monel-metal tubes and monel-clad tube sheets in the original installation has been in service since 1940.

The rates (i.p.y., inches penetration per year) at which several common materials are attacked by 2 per cent caustic soda solution boiling at 250 F. are:

	I.p.y.
Mild steel	0.0200
Monel metal	0.0014
70-30 Cupro nickel	0.0250
5 per cent nickel steel	0.0038
Ni-resist iron	0.0230
Cast iron	0.0700

Perspective Representation Of Intricate Piping Layouts

by Max Berger*



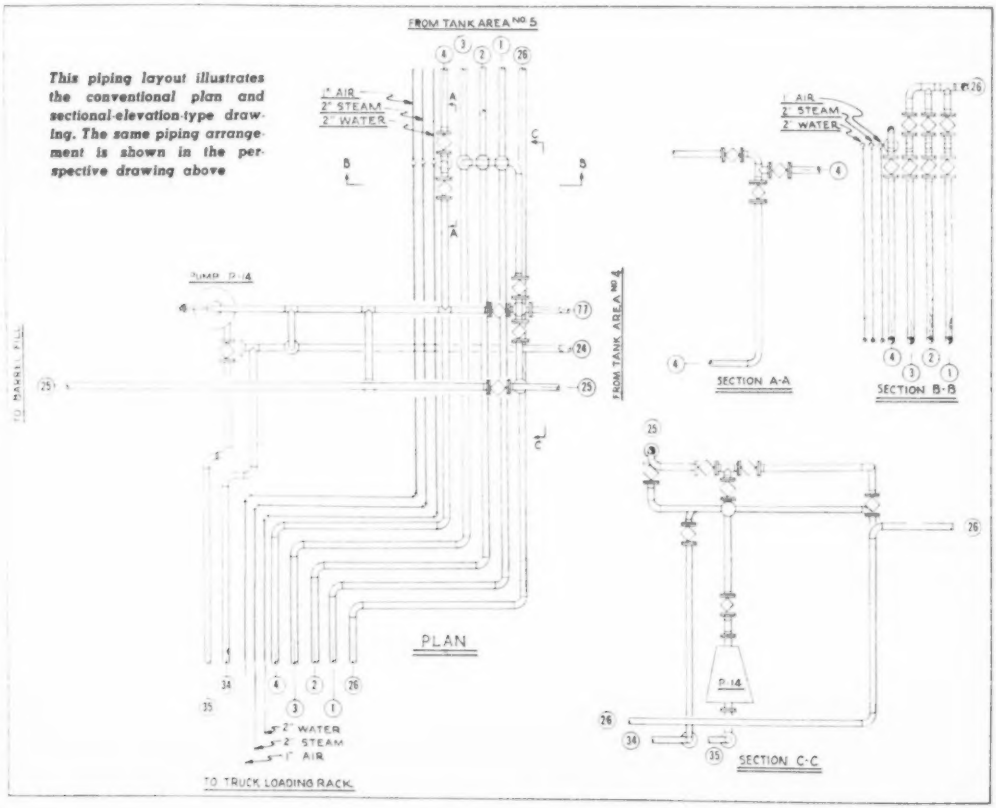
The perspective drawing of a piping layout offers a clearer picture for operating personnel

PERSPECTIVE drawings of complicated piping installations have particular value in the field as well as in the engineering office. The problem of representing in two dimensions an installation which will be completed in three dimensions is difficult even when the project is a simple one. But when the piping layout is complex as it commonly is in refineries and in chemical-process plants, it is difficult to represent in plan and almost impossible to explain it to anyone but to an engineering draftsman.

The root of this difficulty lies in the fact that in the conventional plan—elevation and section drawings must serve both qualitative and quantitative ends, but actually they are qualitative only. Isometric drawings have been used to represent piping layouts. They introduce, however, a pictorial distortion. For the isometric drawing is drawn to scale. Thus, in isometric drawings parallel lines do not converge, as they do in perspective, but remain parallel and therefore appear to diverge.

The perspective drawing is purposely designed to distort, for clarification, the relationship of valves and

*4737 Tobias Avenue, Sherman Oaks, Calif.



This piping layout illustrates the conventional plan and sectional-elevation-type drawing. The same piping arrangement is shown in the perspective drawing above

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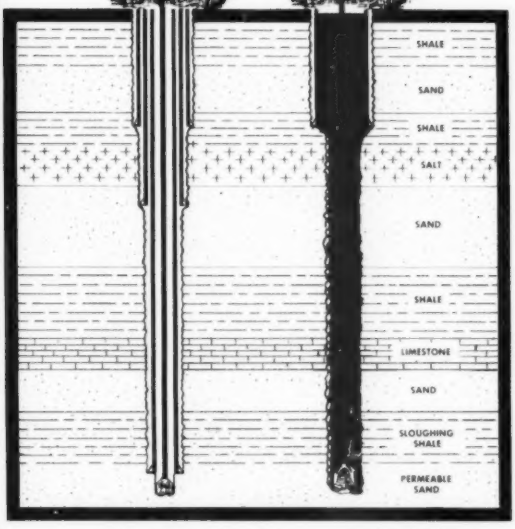

The well on the left is an example of where two additional strings of protective casing were necessary — one to protect a zone of rock salt and the other to protect a sloughing shale. My-Lo-Jel Mud eliminated the necessity for this extra casing.

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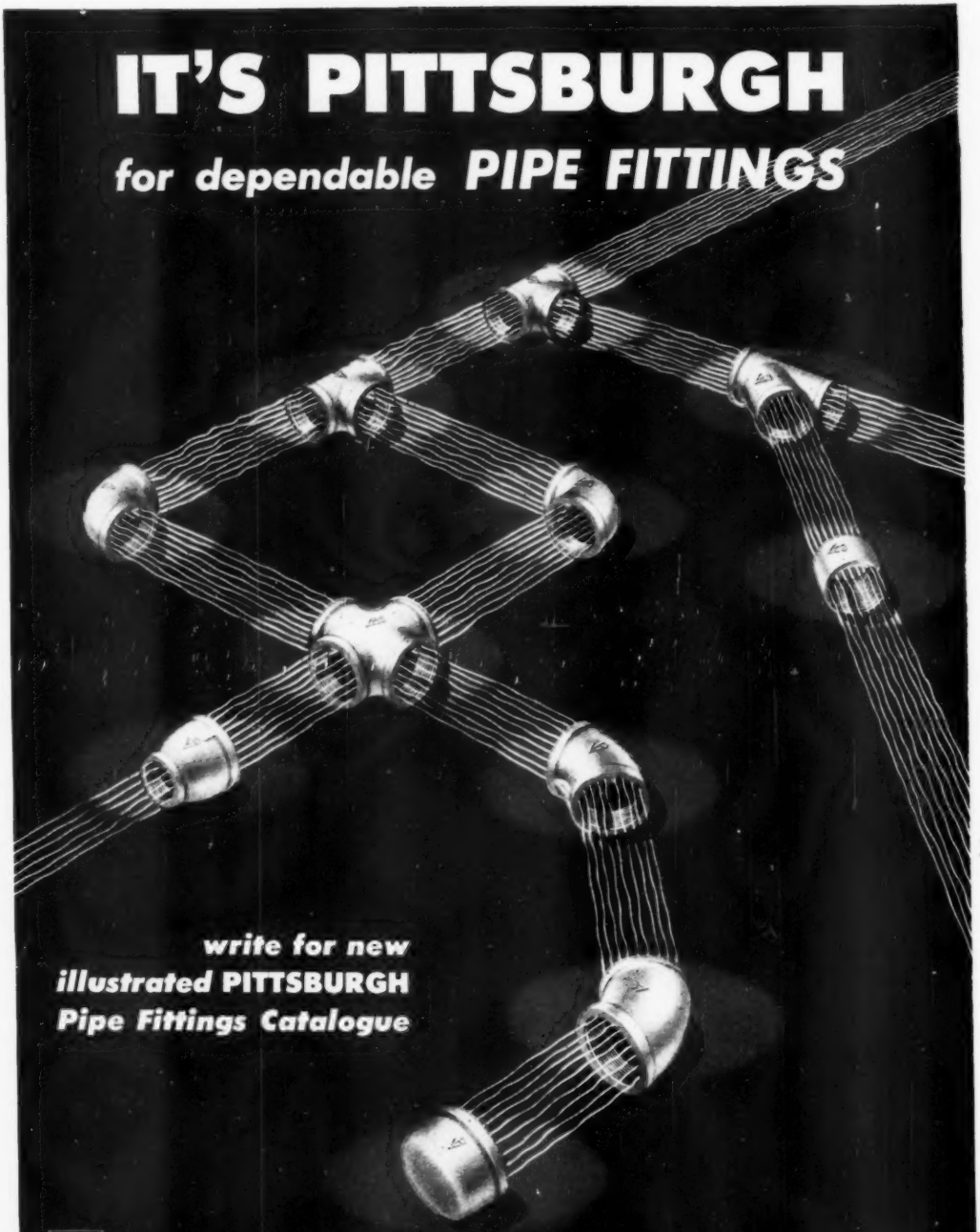

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fittings to the piping layout. Nevertheless, the perspective drawing shows at a glance (see Fig. 1) the relationship in space of pipe, valves, instruments, pumps, etc., which is something not easily visualized in a conventional orthographic projection.

The perspective is a picture. It translates for the nontechnical personnel, for the administrative executive, as well as for the unskilled, the technical language of the blueprint. A conventional piping drawing, for example (see Fig. 2), must be studied intensively for several hours even by one who is thoroughly experienced in blueprint reading. Such a drawing is and will continue to be a mystery to anyone else.

But the clear diagram of a perspective solves the mysterious problem of the blueprint and results in a considerable saving of man-hours. Perspective drawings, for example, can be of great use in checking the proper location of valves and instruments with respect to the flow diagram. They facilitate the taking off of valves, fittings, and instruments for requisition purposes. And because they give a clear and immediate picture of how the finished job will look, the perspective-drawing sketches made while the project is still in the design stage will often show up uneconomical and inefficient layouts.

Speed Up and Simplify Detailing

Furthermore, perspective drawings speed up and simplify pipe detailing. The positions of spools, valves, and instruments are plainly indicated, thus giving field crews a beforehand knowledge of how their work must look. And for this reason, too, prespective drawings are invaluable for training operators, as well as for explaining complicated layouts and designs to nontechnical personnel.

The utility of perspective drawings became very much apparent on a recent asphalt-plant construction job in the Southwest. In designing a piping layout in connection with plant modernization a freehand perspective sketch was prepared by the writer. From this sketch a preliminary plan and section drawings were developed. Using both perspective and conventional drawings, the usual change and revision process was completed until a final set of conventional working drawings was ready. The perspective sketch was kept up to date.

It is not suggested that the perspective drawing can or should replace the conventional drawing. For quantitative reasons alone, the plan drawing will always be the end product of engineering and drafting and will continue to be the prerequisite for actual construction.

The perspective drawing is recommended only as a simple and practical way of showing clearly the qualitative relationships. For when the perspective drawing is used in conjunction with a conventional orthographic projection the combination of the two methods produces an unusual whole. When used in conjunction with the standard plan and section drawings, the perspective layout speeds up engineering and construction.

Pressure Maintenance At Magnolia

(Continued from page 64)

Fresh water from the nearby wells is added to the brine as it passes from the upper to the lower compartment. The fresh water could have been mixed with the brine in the accumulator tank as analyses have shown it does not contain any solids. However, in the event the fresh-water wells might some day produce sand it was thought best to run this water through the filter. No harmful precipitates are formed as a result of the mixing.

From the filter tank the mixture of brine and fresh water flows to the accumulator tank, which serves as dual purpose of providing water for back-washing the filter and of regulating the flow of water to the input well. At the two wells which take water under vacuum, 1 Aubrey and 1 Crisp, a float-operated valve automatically dumps the water from the tank into the injection well line. At the Gunnels and Jameson input wells, where input pressures of 1,600 and 700 psi. are required, respectively, high-pressure pumps take suction from the accumulator. Average daily and cumulative volumes on March 31, 1948, injected into the four wells are given in Table 1.

1949-1948 Comparisons

Table 2 shows the daily average fluid of gas withdrawals, total water injected, and reservoir voidage for the past 15 months. Comparison of data for the first quarter of 1949 with that of the like period of 1948 shows that daily salt-water withdrawals increased by about 1,400 bbl., and that gross reservoir voidage increased by almost 1,700 bbl. daily. Net daily reservoir voidage during this 15-month period, however, declined because of the greater volumes of fresh water injected. For the first quarter of 1948 the net voidage was 14,534 bbl. daily whereas in the first 3 months of this year the average was only 13,379 bbl. daily.

Effect of this reduction in daily net voidage figures is clearly reflected in the pool's bottom-hole pressure trend as shown in the chart and Table 2. For the 15-month period, reservoir pressures declined 47 psi. to an average of 2,774 psi. Thus during this interval—during which 5,640,556 bbl. of oil, 6,074,155 M.c.f. of gas, and 3,166,673 bbl. of water were produced—an average of 120,012 bbl. of oil was recovered for each pound drop in pressure.

Comparison of this recovery with the 67,000 bbl. per pound drop in pressure which was being had under primary methods readily shows the beneficial results being obtained from the project.

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Tide Water Associated Filter Plant

(Continued from page 68)

ing in the three high-pressure-type wax filter units. Filter temperature is maintained at 140° F. Each filter is manifolded at the top for two charge lines, steam, naphtha, and venting.

The time cycle normally is:

	Hours
Clay filling	3.5
Wax filling	2
Running to color	24
Draining	8
Naphtha wash No. 1	3
Naphtha wash No. 2	4
Naphtha wash No. 3	18
Steamout (90-psig. steam)	24
Dumping Clay	4

A 30-60-mesh clay is employed in wax filtration. Charging rate is normally maintained at 40 bbl. per hour per filter. A typical yield of wax is 1,200 bbl. per charge of clay, representing an on-stream period of about 30 hours. Tank color, the test of the accumulated filtered wax in the run-down compartment, controls the filter period.

About 500 bbl. of naphtha are used for the combined washes. All wash naphtha moves direct to steam stills without cycling, thus all naphtha washing is with fresh or distilled solvent. About 1,000 tons of fully refined wax are filtered in the plant monthly.

Color of the unfiltered wax is normally about +2 Lovibond. Eight finished grades are being produced, a 105° F. scale wax and seven grades with melting points of 118°-120°, 120°-122°, 123°-125°, 125°-127°, 128°-130°, 130°-132°, and 133°-135° F. Petrolatum grades are produced with A.S.T.M. melting points of 123°-125° and 130°-133° F. and higher.

Steam Stills

Six individual batch steam stills operated in pairs, reclaim naphtha from washings of the bright stock,

neutral oil, and wax filters. These stills are run at about 260-280° F. with 90-psig. steam in coils and "spray" steam at 150 psig. Naphtha with an initial boiling point of 200° F. and an end point of approximately 300° F. is employed for solvent and wash.

Clay Cycle

Spent steamed clay dumped from the filters moves by belt conveyors, elevators, and screw conveyors to any selected unit of an elevated bank of steamed clay bins. Bin outlets are so manifolded with dual screw conveyors, that contents of any bin may be fed by gravity to any of the three burners.

Two of the Herreshof burners have 10 hearths and the third is a 12-hearth unit. Each burner is split, with two inlets and two outlets. In all three units, clay centers at the top, or first hearth, and exits at the sixth hearth. A second clay charge enters at the seventh hearth and continues through the bottom hearth. This system of splitting feed doubles the clay burning capacity of each burner.

Eight short-flame burners per hearth are employed. Temperature control is effected by Rayotube temperature controls and indicators with radiant pyrometers scanning hearths Nos. 4, 6, 9, and 12. This use of radiant pyrometry gives precise burning control since the temperature of the clay itself is the governing factor in heat input to the burner.

The control system is flexible. In the top section of each burner No. 4 hearth is the central control point while No. 6 is a secondary, independent control. Through Rayotube and Micromax control, flow of gas fuel to burners on hearths 3, 4, and 5 is adjusted through motor-operated valves to maintain proper clay temperature on hearth No. 4. A similar secondary control fixes the gas flow to burners on hearth 6 to maintain proper temperature on that level. In the bottom section of each Herreshof burner, temperature is similarly controlled by the scanning of hearths 9 and 12. The two smaller burners will each revivify up to 5 tons of clay per hour, while the large burner has a burning capacity for up to 6 tons hourly. Clay is burned and reused 16 to 18 times in normal operations.

Each of the three burners is provided with a Pratt-Daniels Termix Type 4 dust collector to recover fines formed from handling of clay. Clay shipments remain segregated in use and a running record of each batch is kept throughout its life in the plant. Thus the location as well as the history of any shipment or batch is continually available from plant records. This allows comparative study of efficiency and activity of various clays.

All clay cooling is done outside the burner units, allowing use of three additional hearths for burning. From the burners, clay passes over Griscom-Russell G-Fintube type coolers similar to those employed for catalyst cooling in the Thermofor catalytic cracking process. At a safe storage temperature, clay is then distributed to the proper burned-clay bins each of which holds an amount of clay equal to one filter charge. Bindicators and agitators control burned clay flow from bins via elevators and belt conveyors to the filter units.

Belt conveyors in the plant will handle an average of 1,250 cu. ft. of clay (18-25 tons) per hours to and from filters. Elevators and screw conveyors range in capacity from 500 to 1,250 cu. ft. hourly.

Major Equipment Requirements

Elevators installed in the unit include:

7 bucket elevators, 60 cu. ft. in length, requiring 840 ft. of rubber fabric belting, for moving steamed clay to storage.

3 chain elevators for 1,050° F. hot clay service. These consist of 426 ft. of chain, with 426 buckets on 12-in. centers.

3 chain elevators for moving burned clay from storage to filters, comprising 384 ft. of chain and 384 buckets. Fabricated from Link-Belt equipment, these elevators are driven on roller chain by 13 induction motors averaging 5 hp. each, through worm reducer gears.

Belt conveyors include 14 horizontal units ranging from 63 to 174 ft. in length, requiring 3,330 ft. of 18-in. belting. Units handling burned clay last, on the average, 8 to 10 months. The belts moving steamed clay at lower temperatures show 5 to 6 years of service. These Sahara Imperial belting units are driven through gear reducers at speeds ranging from 170 to 300 ft. per minute by motors ranging from 3 to 5 hp.

Screw conveyors number 29, totaling 1,100 ft. of screw. Each is driven through a worm-gear reducer. Screws comprise 12-in. and 18-in. helicoids varying in length from 9 to 85 ft. Motor drives range from 5 to 15 hp.

All valves on filters and manifolds are double installations, more than 1,000 being installed in the filter section alone. A Bailey gravity blending system is employed to control the 60-40 mixture of naphtha and bright stock for solution filtering. Continuous control of flow to maintain a desired blend gravity obviates the need for batch tank mixing as formerly practiced.

Bindicators measure and record the flow rate of clay from storage to burners and filters. Jeffrey vibratory feeders are employed to control the flow of clay from bindicators and coolers.

The entire filter plant was planned and engineered by company personnel. Planning, fabrication, and construction was completed in a record 4½ months.

Compressibility Factors Of Natural Gases

(Continued from page 80)

Or,

$$V_1 = 4,150,000/3,600 \times 24 = 48.0 \text{ cu. ft. per second}$$

The compressibility factor from Fig 2 is 0.895.

The actual volume entering the pipe is,

$$V = .895 \times 48.0 = 43.0 \text{ cu. ft. per second}$$

Cross-sectional area of the pipe is,

$$A = .785\ (19.375)^2/144 = 2.05 \text{ sq. ft.}$$

The linear velocity at the inlet of the pipe is,

$$\text{Velocity} = 43.0/2.05 = 21.0 \text{ ft. per second}$$

Acknowledgment

These charts were prepared by P. P. Swift, G. S. Stenman, W. H. Nichols, J. M. Killen, C. F. Neely, and W. B. Nelson, graduate students in petroleum engineering at University of Tulsa, 1949.

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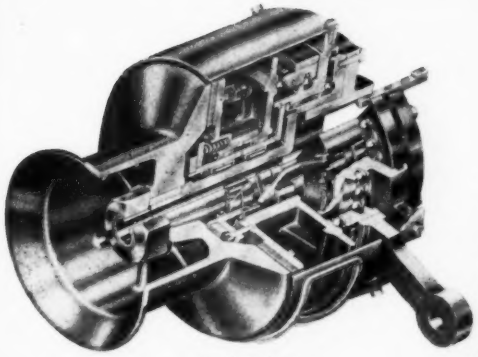
BOOKS

GAS TRANSPORTATION SYSTEM CALCULATIONS. By Benjamin Miller. Published by Moore Publishing Co., 9 East 38th Street, New York. 226 pp.

This book was written primarily for engineers engaged in the design and operation of systems for the transportation of gaseous fuels, and for students preparing to be so engaged, but it will be found useful as well by others faced with engineering problems which involve the flow of gas in pipes, or pipe for high-pressure service, or the compression of gas. To solve such problems or to evaluate proposed solutions nearly always requires calculation; frequently it is necessary to make calculations before the problem can be presented in a form convenient for consideration. This book is concerned almost entirely with such calculations. The basic material used comes from many of the formal divisions of technology, including fluid mechanics, kinetic energy, physical chemistry, thermodynamics, metallurgy, and the theory of elasticity. The work is divided into four parts, these having to do with (1) flow of gas in pipes, (2) specification, inspection, and testing of pipe for gas lines, (3) compression of gas, and (4) economics of gas transportation. It really consists of 40 short articles, which have previously appeared in Gas Age magazine.

Designed for Small and Medium Drawworks



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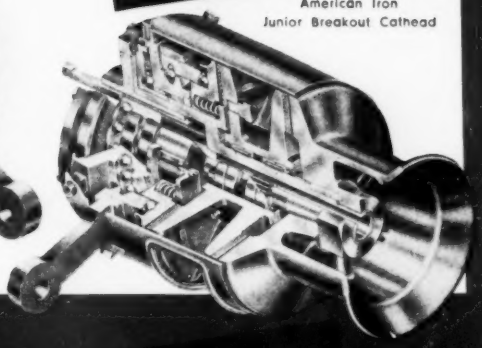

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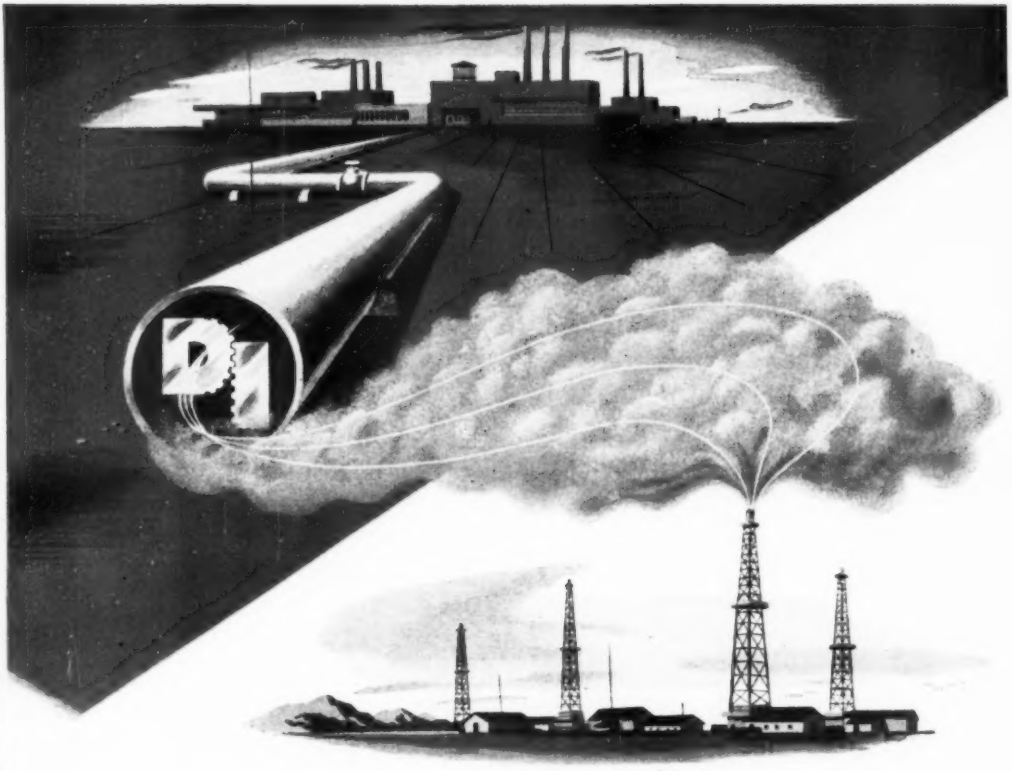

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Calculating Dew and Bubble Points

THE calculations of dew points and bubble points are special cases of the calculation of phase-separation conditions. As in previous calculations, the illustration will be given first for a two-component system.

Consider a system with two components, n-hexane and n-butane, in the ratio of 4 mols n-hexane to 6 mols n-butane. Let the system be at 200 F. and under sufficient pressure that the mixture exists as liquid only. The bubble point is defined as that pressure at which vapor first forms upon reduction in pressure at this temperature. When vapor first forms the composition of the liquid will be essentially that of the total system, i.e., in this case 40 mol per cent hexane and 60 mol per cent butane.

To find the bubble-point pressure, one uses the formula (developed in Engineering Fundamentals No. 383).

$$\text{x-butane} = \frac{1 - \text{k-hexane}}{\text{k-butane} - \text{k-hexane}} \quad (1)$$

Both k-hexane and k-butane are, in general, functions of pressure and temperature, but since temperature is given they are in this case functions only of pressure. Therefore, various pressures can be assumed and k values found at these pressures from appropriate equilibrium-constant charts. The k values can then be substituted in Equation 1 until the right-hand quantity is 0.60, the value of x-butane for the conditions chosen. The pressure which produces this result is the bubble-point pressure. The solution is shown graphically in Fig. 1, where the pressure is seen to be 121 psia.

The composition of the gas which forms at the bubble point can be found by using the k values at 121 psia. and 200 F. These give:

$$\text{y-butane} = \text{k-butane x-butane} = (1.5)\ (0.60) = .900$$

$$\text{y-hexane} = \text{k-hexane x-hexane} = (0.28)\ (2.40) = .114$$

These y values add up to 1.014 due to inaccuracies in reading the equilibrium constant charts.

Calculation of a dew point is found in the same fashion from the equation

$$\frac{\text{y-butane}}{\text{k-butane}\,(1 - \text{k-hexane})} \quad (2)$$

which can be developed in the same fashion as was Equation 1 (see Engineering Fundamentals No. 383). The dew point is defined as that pressure at which liquid begins to form when passing from the vapor to the liquid region. Therefore, at this point the composition of the vapor will be substantially the same as that of the entire system. For the system being considered this value is y-butane = .60. Again, the temperature is given and k values vary only with pressure. The right side of Equation 2 can be plotted versus pressure and at the point where the curve crosses 0.60 the dew-point pressure is found. In Fig. 1, this pressure is seen to be 60 psia.

The composition of the liquid which forms at the dew point can be found by using the k values at 60 psia. and 200 F. These give

$$\text{x-butane} = \frac{\text{y-butane}}{\text{k-butane}} = \frac{0.60}{2.8} = .214$$

$$\text{x-hexane} = \frac{\text{y-hexane}}{\text{k-hexane}} = \frac{0.40}{0.52} = .770$$

These x values add up to .984 due to inaccuracies in reading the equilibrium constant charts.

The above techniques can be applied just as well to a system of more than two components although the resulting equations cannot be written so simply as Equations 1 and 2.

In computing dew-point and bubble-point pressures on complex systems it is necessary to have the composition of the system as a whole. In computing bubble points this composition is taken to be that of the liquid, and in computing dew points it is taken to be the composition of the vapor. Again, the temperature must be fixed. The equation for computing bubble points becomes

$$1.0 = k_1x_1 + k_2x_2 + k_3x_3 + k_4x_4 + \ldots + k_nx_n \quad (3)$$

where the k values vary only with pressure because the temperature is fixed. The equation for computing dew points becomes

$$1.0 = \frac{y_1}{k_1} + \frac{y_2}{k_2} + \frac{y_3}{k_3} + \frac{y_4}{k_4} + \ldots + \frac{y_n}{k_n} \quad (4)$$

Either of these equations can be solved graphically by the same technique used in solving Equations 1 and 2.

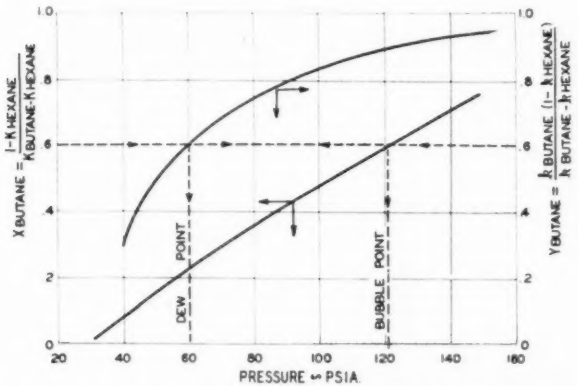

Fig. 1—Variation of Equations 1 and 2 for the estimation of bubble pressure and dew pressure

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Chemical Equipment—2

(See Cost-imating No. 43, August 11, for other equipment)

TABLE 1—APPROXIMATE INSTALLED COST (1946) OF CENTRIFUGAL SEPARATORS,[1,2] DOLLARS PER DRIVER HORSEPOWER*

Driver (hp.)	Suspended basket†		Bird solid bowl		Sharples super D stainless
	Steel	Stainless	Steel	Stainless	
2	2.90	4.20			
4	3.40	4.70		6.60	
7	3.80	5.40	5.80	7.60	
10	4.20	5.90	6.70	8.50	14.50
20	5.30	7.60	8.50	12.00	19.00
40	6.60	10.60	12.70	17.00	27.50
70	..		17.00	25.00	41.00
100			23.00	33.00	
200			40.00	61.00	

*See Reference 2 for horsepower ratings. †American Tool & Machine Co.

TABLE 2—APPROXIMATE INSTALLED COSTS (1946) OF AGITATED VESSELS,[1,2] DOLLARS EACH

Size (gal.)	Agitated tanks		Autoclaves*		
	Steel	Stainless	Steel	Glass-lined	Stainless
100	770	1,250		2,800	7,200
200	1,050	1,750		3,850	8,500
400	1,450	2,450	4,100	5,300	10,000
700	1,850	3,200	5,200	6,800	12,200
1,000	2,200	3,700	5,900	8,000	13,000
2,000	3,000	5,250	7,500	10,500	15,200
4,000	4,100	7,400		14,500	
7,000	5,200	9,500			
10,000	6,000	11,000			
20,000	8,200	15,700			

*Jacketed reaction vessel with moderate agitation and for pressure up to 100 psi.

TABLE 3—APPROXIMATE INSTALLED COST (1946) OF TOWERS,[1,2] DOLLARS PER PLATE (OR PER FOOT HEIGHT)*

Diameter (in.)	Packed towers						Bubble-cap		
	Steel	Haveg	Copper	Stainless	Glass-lined	Silver-lined	Steel	Copper	Stainless
6	36			70					
12	57		85	120			85	145	210
24	95	120	160	215	320	430	160	240	355
36	140	180	240	340	480	660	240	340	550
60	240	330	425	660	830	1,200	425	580	980
84	355	500	680	1,040		..	680	870	1,600
108	490	680	970	1,480			970	1,150	2,200
168	915		1,860	2,800			1,860	2,300	4,250
240			4,900				4,900		

*See also Cost-imating Nos. 11, 12, 13, December 30, 1948, January 6 and 13, 1949. The values of Table 3 for bubble towers are less than half of the costs of Cost-imating Nos. 11 and 12, possibly because much of the construction labor is not included. Because Chilton adds large factors for engineering and contingencies, and no support skirt, foundation, insulation or freight is included.

TABLE 4—APPROXIMATE INSTALLED COST (1946) OF CYCLONE SEPARATORS,[1] DOLLARS EACH

Diameter (in.)	Steel	Stainless
4	150	
7	185	260
10	210	370
20	330	1,100
40	800	3,600
70	2,050	10,000
100	4,000	18,000

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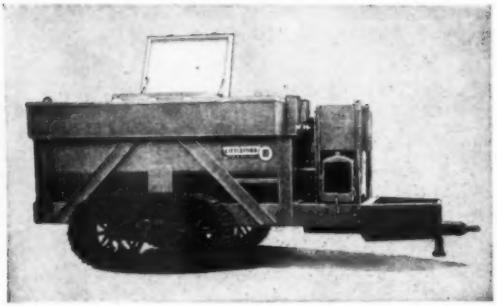
2. Eckhardt, H., Centrifugal Separator Costs, Chem. Eng., May 1947, p. 121.
3. Bliss, H., Data for Equipment Cost Estimating, Chem. Eng., May 1947, p. 126.
4. Brummerstedt, E. F., Economic Design of Pressure Vessels, Pet. Refiner, 22, 315 (1943).
5. Williams, R., Chem. Eng., December 1947, p. 124.

No. 47 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



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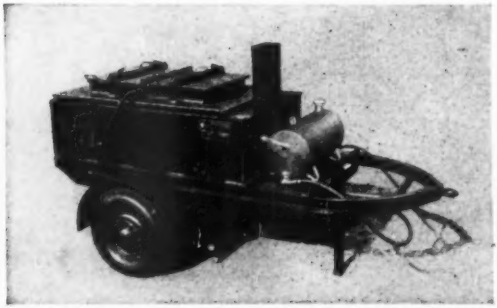

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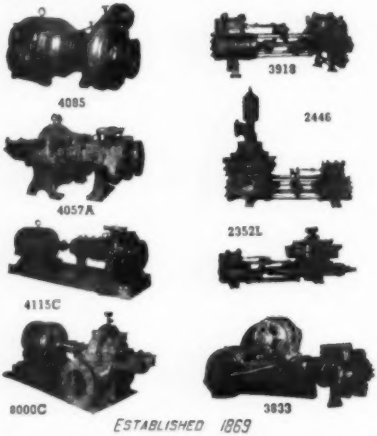

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NATURAL GAS

5 Requests for Gas Lines In Pennsylvania Pending

Federal Power Commission has consolidated proceedings involving five applications relating to the construction of pipe-line facilities which would be used for the transportation and sale of natural gas by Manufacturers Light & Heat Co. to distribution companies serving the Harrisburg, Allentown, Bethlehem, Reading, and Lancaster, Pa., areas. Hearings will commence September 28 in Washington, D. C.

Manufacturers is proposing to construct and install connections with the pipe-line systems of Allentown-Bethlehem Gas Co., Harrisburg Gas Co., Consumers Gas Co., and Lancaster County Gas Co. Each of the four distribution companies has filed an application in connection with the construction of facilities necessary to receive the Manufacturers' gas, and has asked the commission to find in effect that the companies are not subject to FPC jurisdiction, or, as an alternative, to authorize construction of the proposed facilities.

Manufacturers plans to supply the gas from its own system and, subject to regulatory approval, from Texas Eastern which previously was ordered by the commission to deliver up to 7,500,000 cu. ft. daily to the distribution companies in Harrisburg, Allentown, Bethlehem, and Reading. One of the main issues involved in the proceeding is the question whether the distribution companies would be better served (both as to rates and service) directly by Texas Eastern or through Manufacturers as a third party.

Manufacturers is a subsidiary of The Columbia Gas System and has main offices in Pittsburgh, Pa.

All Requests Consolidated For Virginia Gas Service

Federal Power Commission has consolidated applications filed by Eastern Natural Gas Co. and Virginia Gas Transmission Corp. with proceedings involving three other applications which were previously consolidated and scheduled for hearing September 14 in Washington, D. C. All five applications involve construction of natural-gas transmission facilities in Virginia.

The three applications previously consolidated for hearing were filed by Commonwealth Natural Gas Corp., Virginia Natural Gas Co., and Piedmont Natural Gas Corp. The proposed Piedmont line would extend from Louisiana through Mississippi, Alabama, Georgia, North and South Carolina, and into Virginia.

Commonwealth, Virginia Natural, Piedmont, and Eastern all propose, among other things, to transport and sell natural gas for resale in Richmond and Norfolk, while Virginia Gas is proposing to deliver and sell natural gas to Commonwealth to meet that company's requirements.

Eastern and Virginia Natural both have main offices in Richmond, Virginia. Piedmont's offices are in Spartanburg, South Carolina, Commonwealth's in Lynchburg, Virginia, and Virginia Gas' in Charleston, W. Va.

Gas-Company Operating Revenues Increase 8.6%

Operating revenues of natural-gas companies reporting to Federal Power Commission totaled $65,509,693 in June, an increase of 8.6 per cent over the $60,341,881 reported for the same month a year ago.

Gas-utility operating income for June amounted to $8,456,516, down 1.6 per cent from the $8,592,784 reported for June 1948. Net income for the month was $7,765,553 compared to $8,650,859 reported in June 1948.

Gas-operating revenue deductions amounted to $57,072,381, an increase of 10.2 per cent. Of this total, operating expenses accounted for $43,997,962, up 14.2 per cent; depreciation for $7,009,810, a gain of 13.2 per cent; and taxes for $6,064,609, a decrease of 13.8 per cent.

Gas sales to ultimate consumers in June were 115,883,000,000 cu. ft., an increase of 3.3 per cent over June 1948. Sales to residential consumers decreased 0.8 per cent while sales to commercial and industrial consumers increased 3.1 per cent and 3.6 per cent, respectively. Revenues from sales to ultimate consumers increased 4 per cent and amounted to $31,447,528. Revenues from the three classes of service, residential, commercial, and industrial increased 1.6 per cent, 4.1 per cent, and 5.9 per cent, respectively.

For the 12 months ended June 30, gas-operating revenues aggregated $941,789,909, an increase of 16.8 per cent over the total of $806,420,265 reported for the 12 months ended June 30, 1948. Net income for the period amounted to $165,782,743, compared to $149,327,161 for the previous 12 months, or an increase of 11 per cent.

Southern Union Gas to Buy New Mexico Gas Properties

Southern Union Gas Co. has contracted to purchase the natural-gas distributing properties of Public Service Co. of New Mexico, C. H. Zachry of Southern Union announced recently. The transaction is reported to involve approximately $4,000,000.

Zachry reported the purchase should be completed in about 45 days. Public Service handles retail natural gas in Albuquerque, and buys gas wholesale from Southern Union.

Ohio Fuel Gas' Proposed Rate Tariff Suspended

Federal Power Commission has suspended, pending hearing and decision, a proposed natural-gas tariff filed by Ohio Fuel Gas Co. which would increase its rate for wholesale service by approximately $1,228,568 annually, based on anticipated sales for the 12-month period ending February 28, 1950. The commission scheduled a hearing concerning the lawfulness of the rates to commence November 15 in Washington, D. C.

The commission said it has received a number of protests and petitions for hearing in connection with the proposed rate increase, one of the largest ever proposed to FPC by a gas-utility company. The new rate was to have become effective September 6.

Ohio Fuel, which applied for the change in tariff early this month, said that the proposed increase, amounting to about 4.2 cents per 1,000 cu. ft., is necessary because unprecedented postwar demands have required changes in sources of gas supply necessitating large purchases of natural gas from the southwest. The company said this change in operations has required heavy investments in production and transmission facilities of some $25,000,000, and that the cost of gas purchased has increased approximately 3 cents per 1,000 cu. ft.

The three largest wholesale purchasers of Ohio Fuel's gas which would be affected by the proposed change in tariff are Cincinnati Gas & Electric Co. with an estimated increase of $283,199; Dayton Power & Light Co., $682,712 and West Ohio Gas Co., $122,916.

Pipe Removal Under Study

Oklahoma Corporation Commission has taken under study a request of Oklahoma Natural Gas Co. for permission to take up and move a 10-mile pipe line serving 18 customers in Seminole County, between Bowlegs and Wewoka. Company contends operation expense of the line is $5,000 per year, considerably more than revenues taken in. The firm wants to sell the line for $50,000.

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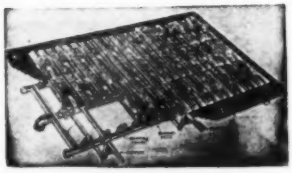

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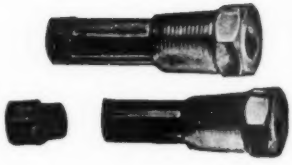

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PIPE LINES

Construction on Mid-Valley Line to Begin in October

Construction of Mid-Valley Pipeline Co.'s 1,000-mile pipe line from Longview, Tex., to Lima, Ohio, is scheduled to begin October 6.

The firm was formed for the purpose of constructing and operating the line, and is sponsored jointly by Standard Oil Co. (Ohio) and Sun Oil Co.

Work on two of the crude-oil terminals for the $65,000,000 project, for which part of the financing is currently being negotiated, is already under way.

At Mayersville, Miss., foundations for the first four of eight 81,000-bbl. storage tanks are completed and drainage ditching and dirt work for dikes have been finished.

At Hebron, Ky., three tank foundations have been completed and the tank bottoms laid and welded. Dike work is progressing and shells of the tanks are expected to be in place shortly. Storage tanks are being erected at both terminals by Chicago Bridge & Iron Co. *(A complete list of contractors and the sections on which they will work was given in The Oil and Gas Journal, August 11, 1949, page 111).*

The company has completed arrangements for financing construction of its crude-oil line. An issue of $49,500,000 of pipe-line sinking-fund bonds, secured by mortgage on the facilities, has been authorized to be issued and sold to a group of institutional investors prior to December 31, 1950.

The Equitable Life Assurance Society of the United States will purchase $33,000,000 of the bonds to be due January 1, 1967, with interest at 3⅝ per cent. A group of six banks, headed by the Chase National Bank of the City of New York, will purchase $16,500,000 of the bonds to be due January 1, 1957, with interest at 3 per cent.

Sinking-fund payments on the bonds start in 1952 and will retire the entire amount issued by maturity.

Michigan Wisconsin Starts Madison Area Construction

Michigan Wisconsin Pipe Line Co. is preparing for the laying of 100 miles of pipe in the Madison, Wis., area including 80 miles of 10-in. and 20 miles of pipe of smaller diameter. The contractor, Anderson Brothers Corp., will put two spreads on the job, one of which will be supervised by K. B. Killingsworth.

For the Arkansas Louisiana Gas Co. 72-mile, 20-in., Waskom, Tex.-Magnolia, Ark., section, Anderson Brothers will move in two spreads.

O. R. Burden Organizes New Contracting Company

O. R. Burden Construction Corp., headed by Oscar R. Burden as president, has been organized for the contracting of pipe-line construction. The firm has acquired the equipment of Bill Morrison Construction Co., Tulsa. The Burden company has offices at 2201 Berkley, Wichita Falls, Tex., and 6702 East Twenty-first Street, Tulsa.

Burden was engaged in pipe-line contracting before he became general superintendent of War Emergency Pipelines, Inc. Later he was the Middle East manager in Lebanon for Williams Brothers Overseas Co. and president of Pacific Pipe Line & Engineers, Ltd. P. T. Thibodaux, recently with Wood Engineering Co., Shreveport, is vice president and Oscar R. Burden's son, Jack S. Burden, is secretary and treasurer of the new company.

Stanolind Shuts Down Three Pipe-Line Pump Stations

Stanolind Pipe Line Co. has shut down three pump stations, due to reduction of transportation requirements in Texas.

The stations, at El Reno, Okla., and Childress, Tex., on the firm's 16-in. line from West Texas to Drumright, Okla., and Lakenon station, near Hillsboro, Tex., on the Gulf Coast-Drumright line, are now on a standby basis.

Firm Seeks FPC Authority To Build Line in Ohio

Grand River Gas Transmission Co., of Cleveland, has asked the Federal Power Commission to authorize the construction of 74 miles of natural-gas pipe line in western Pennsylvania and northeastern Ohio. Estimated cost of the project is $1,950,000.

The company proposes to purchase gas from Tennessee Gas Transmission Co. at a point near Meadville, Pa., for transportation either for hire or for resale to delivery points in Lake

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and Ashtabula counties, Ohio. Tennessee recently was authorized by FPC to construct a Kentucky-to-Buffalo, N. Y., pipe line which will pass through the Meadville area.

Grand River's proposed project would consist of 42 miles of pipe line between Meadville and Austinburg, Ohio, from which point a 10-mile line would extend northerly to Ashtabula, Ohio, and a 22-mile line westerly to Fairport, Ohio. The company said it would transport the gas either for hire or for resale to Lake County Gas Co., the city of Painesville gas department of Public Service and the Lake Shore Gas Co.

Two other applications involving similar pipe-line projects to serve substantially this same area are now pending before the commission. These applications, filed by Erie Gas Service Co., Inc., and Lake Shore Pipe Line Co., both call for Tennessee to supply the gas from connections near Meadville.

FPC Permits Mesabi Co. to Withdraw Its Application

Federal Power Commission has permitted Mesabi Pipe Line Co., of St. Paul, Minn., to withdraw an application filed October 4, 1948, in which the company proposed to construct a 400-mile natural-gas pipe line extending from Keokuk County, Iowa, to Itasca County, Minnesota.

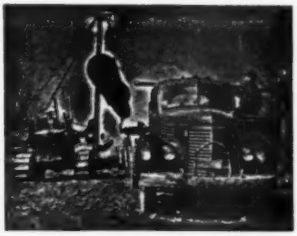
Mesabi originally planned to obtain its gas requirements from the northern terminus of a Louisiana-Iowa pipe line which Trunkline Gas Supply Co. at that time proposed to construct. However, Trunkline subsequently submitted an alternate plan which involved a main pipe line extending from Texas to Nebraska, and this latter route was selected by the commission when it authorized the Trunkline project.

The proposed Mesabi project, estimated to cost $19,291,750, would have had an initial capacity of about 100,000,000 cu. ft. per day. The company proposed primarily to serve iron-ore processors in the Mesabi Iron Range. In addition, Mesabi planned to serve localities now without natural-gas service, distributing companies, and industries along the proposed route.

Southern Natural Gets Approval for Pipe Line

Federal Power Commission has authorized Southern Natural Gas Co., Birmingham, to construct natural-gas transmission facilities designed to increase the capacity of two of its branch lines in Alabama and Mississippi and to supply natural-gas service to a cement company in Alabama.

PARKHILL Strung . . . .



1,463 Miles of Pipe in 1948

Parkhill is now stringing 490 miles of 22" pipe for Shell Oil Company's Cushing, Okla. to Wood River, Ill. pipe line. Parkhill has the facilities to string any size pipe over any type terrain. Let Parkhill expedite the construction of your next line and add you to their long list of satisfied customers.

Roy F. Parkhill Gant W. Fowler

PARKHILL TRUCK COMPANY
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Tulsa, Oklahoma
2000 E. Jasper Phone 4-6159, 4-6150

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The Pipe Line Coating

The Problems of
Corrosion and Electrolysis
Are Serious

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BRIGGS BITUMINOUS COMPOSITION CO.
1347-53 E. Montgomery Ave.
Philadelphia, Penna.

Estimated cost of the project is $1,226,070.

As authorized by FPC, the company will build approximately 38.1 miles of branch loop lines; submarine crossings of the Warrior and Chattahoochee rivers; and a 7.4-mile extension of a branch line to provide service to the Southern Cement Co. plant in Shelby County, Alabama.

Construction of 31.3 miles of the branch loop lines and the crossing of the Warrior River is designed to increase capacity of the company's Montgomery branch line in Alabama from 76,300,000 to 87,300,000 cu. ft. per day. The remaining 6.8 miles of looping, to be constructed in Mississippi, will increase capacity of Southern Natural's Meridian branch line from 12,000,000 to 13,000,000 cu. ft. per day, according to the company's application.

The submarine crossing of the Chattahoochee will parallel an existing crossing and assure continuity of adequate service to the city of Columbus, Ga.

Pipe-Line Traffic and Revenue Show Decline

Transportation revenue of 45 oil pipe-line companies was down 2.7 per cent in the second quarter of 1949 from the same 3 months of last year, Interstate Commerce Commission reports disclosed. At the same time, traffic of the companies' lines declined 11.3 per cent.

Total revenue amounted to $82,143,410 in the April-June quarter, when 566,882,804 bbl. of oil were carried by pipe line. In the same period last year 639,291,684 bbl. were carried by these lines.

Humble Pipe Line Co. carried the most oil, 53,210,594 bbl. in the second quarter, compared with 74,158,692 bbl. the same period during 1948. Its revenue fell 27.3 per cent to $6,834,717.

Largest revenue was earned by Stanolind Pipe Line Co., whose receipts rose 7 per cent to $9,386,560. It carried 36,562,474 bbl., or 730,000 bbl. more than in the second quarter of 1948.

Revenue gains among larger companies were also registered by Interstate Oil Pipe Line Co., Magnolia Pipe Line Co., Texas Pipe Line Co., Phillips Petroleum Co., and Texas-Empire Pipe Line Co.

Of the 45 companies included in ICC's report, 29 reported declines in traffic, while 15 reported higher volume. Largest decline on a percentage basis was reported by Atlantic Pipe Line Co., down 47.7 per cent to 11,739,165 bbl.

Great Lakes Pipe Line Co. reported the largest percentage gain in traffic, up slightly more than 6 per cent to 10,135,359 bbl.

Tennessee Gas Transmission Co. Finances Extension

Tennessee Gas Transmission Co. will sell additional preferred and common stock to finance its natural-gas pipe-line system extension to Buffalo, N. Y.

Directors last week approved a proposed offering of 100,000 shares of a new series of preferred stock, par value $100 per share, and 400,000 additional shares of common stock.

Directors also ordered a common stock distribution to stockholders of one new share for each four now held.

DON'T PAD THAT DITCH

USE KAPCO* ROCK SHIELD

FIELD TESTED FOR . . .

Toughness

- Eliminates cost of padding ditch.
- Protection on road or river crossings.
- Cut to fit any size pipe, in thickness desired.
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Midwestern offers Kapco Rock Shield in a complete "pipeline package" — including fibre strapping, strapping tool, and aluminum seals. Immediate delivery.

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PIPE LINE SURVEYS

None Other Than . . .
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TAPPING MACHINES
Are Guaranteed
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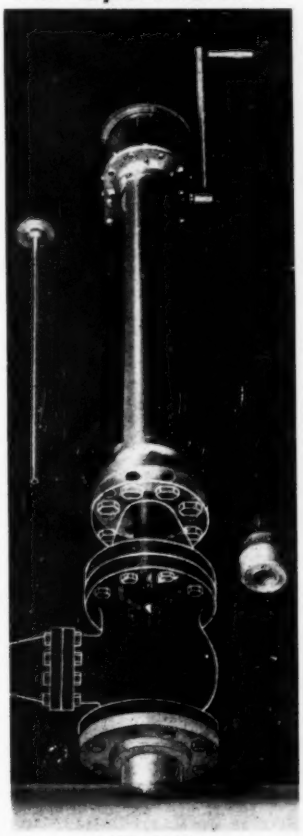

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. . . Against 1000 p.s.i.
Line Pressure

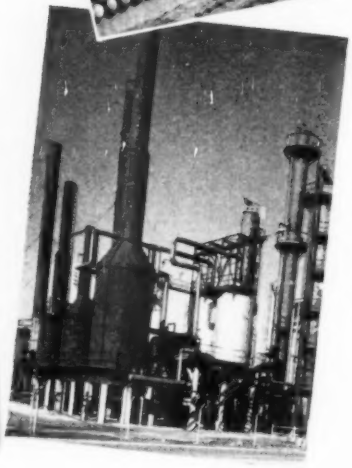
Same machine can be operated by either motor or manual power. One machine for tapping and for plugging of tapping nipple. Light weight — 100 lb. — and compact.

Nominal cutter sizes 1½" to 4". Ball and roller bearings in all main journals.

MODEL 600 for TAPS UP TO 12"

*Patent No. 2,097,398
Other Patents Pending.

THE PIG WITH THE POKE
CLEANS PIPE LINES
T. D. Williamson, Inc.
TULSA 9, OKLAHOMA



get Proved Performance *with* PERCO*

These four Perco Cycloversion* units prove the practical application of this simple, versatile process to current problems in petroleum refining. The unique flexibility of Perco Cycloversion makes it possible for each installation to handle any of three distinct jobs:

1. **Catalytic Desulfurization**—raises the leaded octane of straight run gasolines up to 10 numbers and cracked gasolines up to 5 numbers, dependent upon sulfur content, with no significant volume loss.

2. **Catalytic Reforming**—increases the Research and Motor octane ratings of both refinery and cycling plant gasolines with high yield-improvement factor.

3. **Catalytic Cracking**—cracks gas oils and distillates to yield high octane gasoline, olefinic gases and cycle stocks . . . minimizes fuel oil production.

* A SERVICE MARK

Reprints of recent articles covering operations of the four plants pictured are available upon request. Now is the time for *you* to investigate the many installation and operating advantages of this Perco process. Write us today. There is no obligation, of course.

Phillips Petroleum Company

PERCO PROCESSES

PERCO DIVISION • CHEMICAL PRODUCTS DEPARTMENT
BARTLESVILLE, OKLAHOMA

PROFIT WITH PERCO PROCESSES

REFINING

New British Chemicals Plant to Make Solvents

The new plant of Shell Chemical Manufacturing Co., Ltd., located at Stanlow, near Ellesmere Port on the Manchester Ship Canal in England, which was originally designed as an independent unit to produce solvents by the pyrolysis of gas oil, will now manufacture solvents from the gas produced during normal operations of the adjacent Shell refinery now under construction at Stanlow. Thus, the whole operation will become an integrated process, starting from crude oil and ending with petrochemicals.

The Stanlow plant has been designed for a maximum of automatic control.

The chemicals produced, apart from their solvent use, have a wide application in synthesis in industry, and are processed from petroleum gases which formerly were termed useless refinery by-products. These gases result from cracking oil at high temperature and low pressure and the aim is to produce fractions containing three or four carbon atoms.

Propylene is the three-carbon compound in the lighter fractions and it is reacted with sulfuric acid; the resulting alkyl esters are converted to isopropyl alcohol which, in turn, becomes the basis for many other chemicals. The C_4 fraction, after treatment to remove unwanted constituents, gives butylene and butane, the former in turn, yielding secondary butyl alcohol and methyl ethyl ketone. Initial range of solvents from the Stanlow plant will be as follows: Isopropyl alcohol, isopropyl ether, acetone, diacetone, methyl isobutyl ketone, mesityl oxide, secondary butyl alcohol, and methyl ethyl ketone.

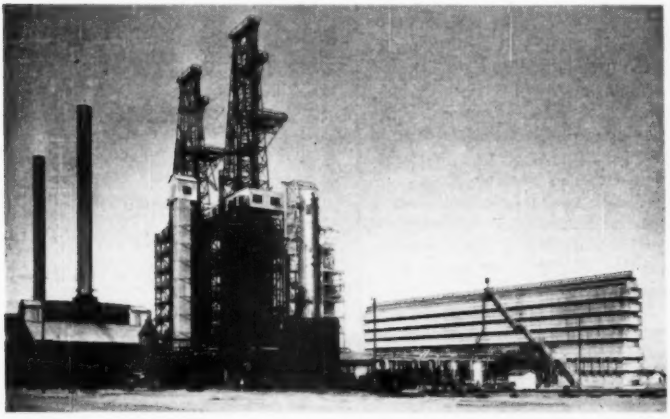
The propelling and circulating of these liquids from one section to another, through stills, tanks, columns, and heat exchangers is done by a variety of special pumps. More than 250 centrifugal units made by Sigmund Pumps, Ltd., are installed in the new plant.

Work Is Well Under Way on Delayed-Coking Addition

The delayed-coking facilities at General Petroleum Corp.'s Torrance, Calif., refinery are being expanded by 50 per cent, and construction work is now well under way. The facilities already are the world's largest.

The original units (see photo below) were built in 1946. Charging capacity of the present installation is 15,000 bbl. daily of heavy fuel oil, and about 20 per cent of the charge is recovered as gasoline and approximately 50 per cent as gas oil.

Some propane and butane is produced along with a large volume of ethane and methane. Approximately 85 lb. of coke is obtained per barrel of fuel-oil charge. The coke is sold.



Present delayed-coking facilities at General Petroleum Corp.'s Torrance, Calif., refinery, already the world's largest installation of its kind. The unit is being enlarged by 50 per cent, with construction well under way. Present daily charge capacity is 15,000 bbl.

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PLUG VALVE LUBRICATION

DESCO LUBRICANTS

Packed in convenient, time-saving, individual barrel size sticks. Packed 12 sticks to a carton, 6 cartons in a case.

DELTA GUN

Light-weight, all steel, chrome finish. Easy to carry, easy to load. Fast snap-on snap-off operation. Develops 10,000 lbs. pressure.

DELTA FITTINGS

Single and double-check and combination lubricant screw fittings for any lubricated plug valve.

DELTA-DESCO SYSTEM . . . .

. . . . saves labor, saves valves and expensive repairs, saves space, reduces warehouse stock.

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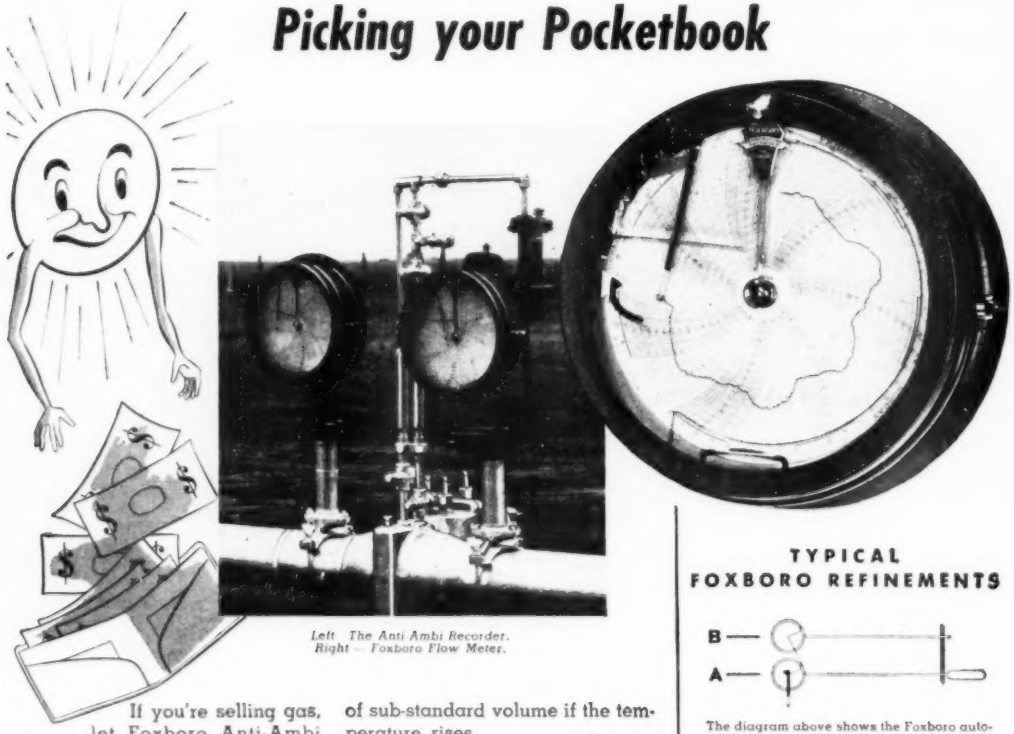
HOW TO KEEP THE WEATHER FROM

Picking your Pocketbook



Left—The Anti-Ambi Recorder.
Right—Foxboro Flow Meter.

If you're selling gas, let Foxboro Anti-Ambi Temperature Recorders protect you against expansion or contraction losses due to the ups and downs of the weather. They'll give you continuous, accurate records of gas temperature . . . permitting full correction for every variation and precise accounting of deliveries.

Temperature changes raise havoc with gas metering. With orifice meters, a variation of only 10 F., unless corrected for, causes an error of 1% in metered volume. (With displacement meters, this error is twice as great.) When you're selling gas, this means an actual out-of-pocket cash loss if the temperature drops, or the delivery of sub-standard volume if the temperature rises.

Like other Foxboro Instruments for the oil and gas industry, the Anti-Ambi Recorder is extremely rugged as well as accurate. Designed for service in the "wide-open spaces", it has a weather-tight case. It's fully compensated for external temperature changes . . . built to operate under the roughest conditions, with a minimum amount of attention. These are reasons why more Foxboro Anti-Ambi Recorders are in service today than all other makes combined.

Get all the facts about these better-engineered instruments. Write for Bulletin 376. **The Foxboro Company, 60 Neponset Ave., Foxboro, Mass., U. S. A.**

TYPICAL FOXBORO REFINEMENTS

The diagram above shows the Foxboro automatic compensation for ambient temperatures. Both the primary measuring system (A) and compensating system (B) are contained in the same instrument case (and length of protective tubing). The compensating system acts as an automatic zero setting for the primary system. Instrument and compensation are calibrated at the same time.

This drawing shows the small diameter, quick response bulb used with the Foxboro Anti-Ambi Thermometer. The bulb is made with a stainless steel neck to reduce conduction effects.

The bulb is protected by the special socket shown above. It has aluminum fins for rapid heat transfer to the bulb and a stainless steel extension to minimize heat conduction to the socket head.

FOXBORO REG. U. S. PAT. OFF. **Anti-Ambi THERMOMETERS**

almost exclusively, for manufacture of electrodes.

Existing plant has four stainless-steel-lined coking drums 17 ft. in diameter and 80 ft. high. Expansion will add two more coking drums to the plant, and an additional furnace will be built and water-cooling facilities enlarged.

The existing fractionating tower will be suitable for handling increased loads with only minor changes.

Design engineering for the project is by M. W. Kellogg Co., with construction by Bechtel Corp. Completion is scheduled in early 1950.

Diesel-Engine Symposium Held at Wisconsin U.

A 6-day symposium on diesel engineering was held last week at University of Wisconsin, with top experts getting an "inside look" at some of the newest parts employed in the engines and information on developments of diesel fuels.

Sixteen engineering firms which make parts or products used in diesel-engine operation exhibited at the symposium, and Prof. W. J. Feiereisen, of Wisconsin College's engineering staff, was in charge.

The meeting was sponsored by the university in cooperation with the Diesel Engine Manufacturers' Association.

W.P.R.A. Report Shows Drop In Lube-Oil Manufacture

A report by Western Petroleum Refiners Association of 13 companies operating in the Mid-Western area shows that manufacture of lubricating oils in June 1949 was considerably below the same month a year ago.

The 13 companies reporting showed that total bright-stock manufacture during June was 193,068 gal., compared with 266,957 gal. in June 1948. Other figures showed the following: solvent bright stock, 85,315 gal. in June 1949 compared with 104,780 gal. the same month in 1948; 375,465 gal. viscous neutrals in June this year compared with 501,596 gal. the same month a year ago; 235,106 gal. solvent viscous neutrals in June compared with 267,279 gal. in June 1948, and 78,505 gal. paraffin oils, compared with 73,281 gal. the same period a year ago.

Total steam-refined stock manufactured in June 1949 was 31,850 gal. compared with 18,507 gal. the same month a year ago, and total blended oils was 433,643 gal. compared with 470,679 gal. in June 1948.

Tide Water Introduces New Brake Cam, Anchor Grease

Tide Water Associated Oil Co., after experiments with various bus and truck fleets, has introduced a new product, Veedol brake cam and anchor grease, developed specifically to overcome difficulties which arise in brake systems of passenger cars, trucks, buses, and other automotive vehicles through the sticking or seizing of brake cams and anchor pins.

The company claims that by improving the brake performance of road vehicles the new grease will be an important factor in safety of drivers and pedestrians.

The firm claims that the new grease prevents development of rust on operating parts of brake assemblies.

NEEDS NO SEALING COMPOUND

UNBRAKO

DRYSEAL THREAD PRESSURE PLUG

. . . seals pressure-tight without the use of sealing compounds. Features the "Dryseal" Pipe Thread originally developed for use with SO_2, ammonia, and other refrigerants. Offers a valuable solution to leakage problems in high pressure equipment of all kinds.

Unique design of the "Dryseal" Thread provides actual crushing and sealing at both major and minor diameters, effectively preventing spiral leakage, even under extreme pressures.

Incorporates all the important features of the regular UNBRAKO Pressure Plug, including fully formed threads, uniform taper and perfect roundness.

A full range of sizes from 1/16" to 2", National Pipe Thread Fuel, is available. Full details are given in Bulletin 675.

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No costly installation, simply replace present Disc with McMurry Relief Valve Disc.

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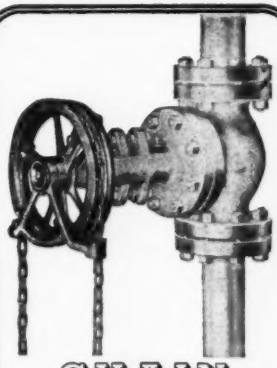

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TO OPERATE THOSE HARD TO REACH, OVERHEAD VALVES-- TRY CHAIN WHEELS.

Pacific's, low cost, Universal Type can be quickly attached to the rim of the Valve's handwheel--ready to work in a few minutes. Available in sizes to fit handwheels from 2" to 26" in diameter. These heavy duty chain wheels are cast of strong gray iron and their chain guides (furnished with all wheels) are cast of malleable iron.

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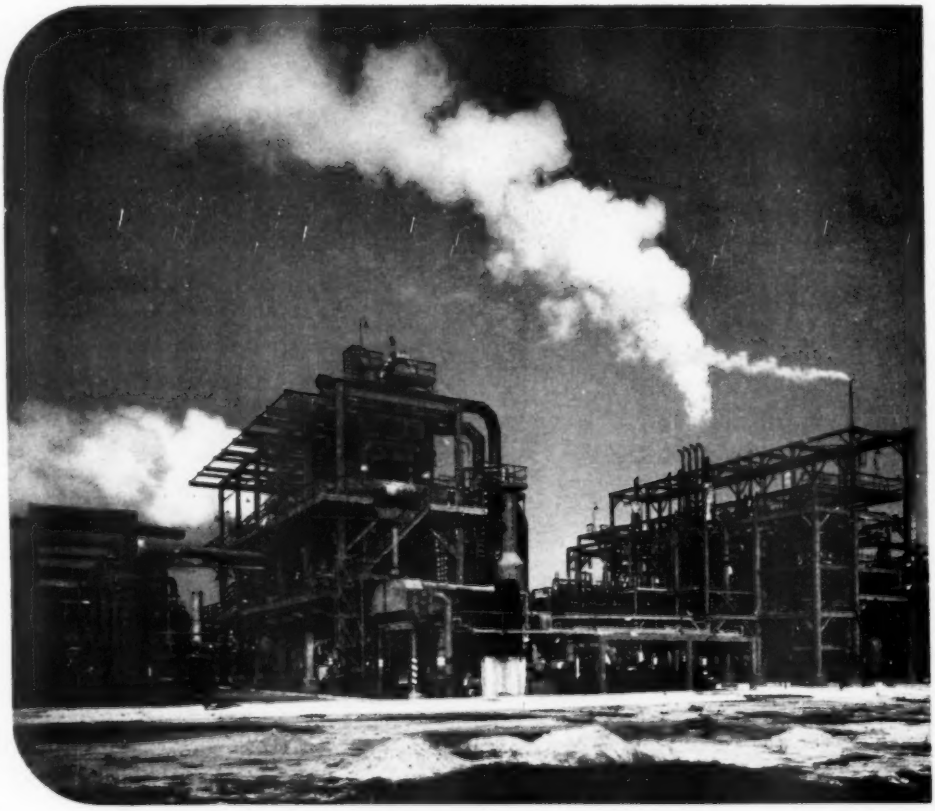

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Badger's organization works as a supplement to the client's permanent engineering staff

Many large companies having permanent engineering and technical staffs of their own for long range planning and current operations employ Badger for immediate major expansion projects. Because we work for many clients as their supplementary engineering department, we maintain an organization fully equipped to absorb your overload. This relieves management of the responsibilities often arising from sudden increases in engineering, procurement and construction loads and further permits the client's key technical personnel to work in close cooperation with us as the project may require.

Badger's ability to work as a supplemental organization, backed by broad experience in the petroleum, chemical and petro-chemical fields, insures overall execution in accordance with the client's concepts without the necessity for burdensome attention to details.

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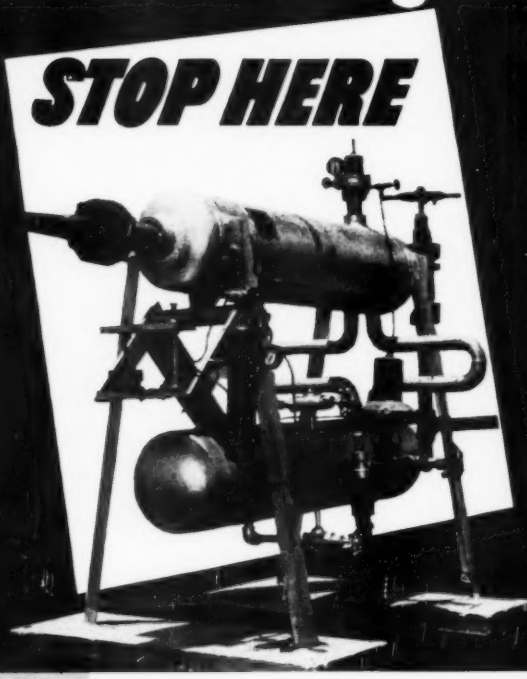
PETRO-CHEMICAL INDUSTRIES **A SUBSIDIARY OF STONE & WEBSTER, INC.**

Your Gas Line Freezing Troubles



PARKERSBURG HYDRACEPTER

PATENTS PENDING

For the PREVENTION of GAS LINE FREEZING

Parkersburg Hydracepter stops gas line freezing . . . cold. By intercepting and removing free water at the point where the maximum portion is in the liquid phase, the Hydracepter eliminates hydrate formation . . . the cause of gas line freezing.

Installed in the line, the Hydracepter actually becomes a part of it. As the gas flows through the scrupper in the upper chamber, water-laden condensate is conducted to the settling chamber (lower vessel) where additional separation takes place. The water-free condensate returns to the upper chamber and on down the gas line.

The lower chamber serves as the float. When a pre-determined volume of water has accumulated in the chamber, the Strain Gauge Pilot, releases pilot gas to open the diaphragm liquid dump valve.

Hydracepter is your best assurance of preventing gas line freezing and costly, troublesome shutdowns during the winter months ahead. Ask your nearest Parkersburg representative for details or write for Hydracepter bulletin 549.

PARKERSBURG RIG AND REEL CO.
Parkersburg, West Va.

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PARKERSBURG

Among the

Drilling Contractors

Willis Leaves Olney Firm

Walter W. Willis, formerly vice president of Calvert & Willis, Inc., Olney, Ill., active contracting and oil producing organization in the tri-state area of Illinois, Indiana and Western Kentucky, has disposed of his stock in the corporation to F. A. Calvert, Jr., president, who now is the controlling stockholder. The corporation will continue to operate under the same name. It has four rotary rigs running in the area.

Magner Joins Rowan

Rowan Drilling Co., Houston, announces that J. C. Magner has become associated with its organization as oil company contact representative. Prior to his new connection, Magner was with Sun Oil Co., H. L. Hunt Co., and Continental Supply Co.

Coppinger and Southern Drilling Co., Wichita, is the contractor on a wildcat test being drilled by Musgrove Petroleum Co. in 31-17-13, northwest of Hoisington, Barton County, Kansas.

Murfin Drilling Co., Wichita, is moving in tools for a wildcat test to be drilled for Consolidated Gas Co. on the latter's Free lease in 31-7n-15e, 5 miles north of McAlester in Pittsburg County, Oklahoma.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area	Week ended 8-29-49	Change week ended 8-22-49	Change week ended 8-30-48
Gulf Coast	535	+21	—49
W. Tex.-N. M.	519	—24	—84
Ark.-N. La.-E. Tex.	165	—1	—14
Oklahoma	225	—8	—86
Kansas	109	+5	—26
Illinois-Eastern	126	0	—33
Rocky Mountains	113	+5	—54
Pacific Coast	170	+1	—2
Total U. S.	1,962	—1	—348
Western Canada	69	—4	+18
Total	2,031	—5	—330

*Courtesy Hughes Tool Co.

Brinkerhoff Drilling Co., Casper, Wyo., is drilling on its contract for Lion Oil & Refining Co. at 1 Government, 27-12n-100w, a mile south of the Hiawatha Dome field in Moffatt County, Colorado. The test is projected to 4,500 ft. in exploration of Tertiary sands.

Standard-Fryer Drilling Co., Dallas, is moving in a rotary rig for Ted Weiner and James H. Snowden 1-E Vaugh, 88-OP-GC&SF Survey, 5½ miles south of the Midway Lane field, Crockett County, West Texas. It also is moving a rig from Cherokee County, East Texas, to deepen an old hole in Midland County which was drilled in 1945 by Seaboard Oil Co. to 5,004

Day-tour crew for Lofland Brothers Co., contractor for Western Gulf Oil Co. in the Paloma field, Kern County, California. Left to right: J. Gossett, fireman; M. T. Gaylor, pipe racker; Gene Perry, lead tong; M. E. Long, cathead; Dempsey Moore, derrick; C. K. Hester, driller

PENBERTHY

"REFLEX"

WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

USE 'BESTOLIFE IT'S BETTER

'BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years—is immediately available through more than 100 distributors in the U.S.A.

Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE—it's BETTER!

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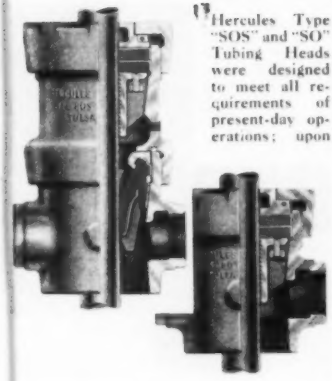
HERCULES
"SOS" and "SO"
STRIPPER
HEADS

DESIGNED BY THE MEN WHO USE THEM...



Hercules Type "SOS" and "SO" Tubing Heads were designed to meet all requirements of present-day operations; upon the opinions and suggestions of roustabouts, drillers, pumpers, engineers and other field men, as to what design and important features should be included in an ideal Stripper Tubing Head.

When you need Tubing Heads, order those that assure you improved performance and economy—Order Hercules "SOS" or "SO" Tubing Heads.

Write for Bulletin No. 229-SOS

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HERCULES TOOL COMPANY
Manufacturers of Oil Field Equipment
General Office and Plant:
17th and Phoenix
P. O. Box 286, Tulsa 1, Oklahoma
Cable Address "HERTOCO"
Telephone 3-1186

ft. The latter is 1 Faeskin, 12 miles east of Midland. Hole will be deepened to 8,000 ft. It will be a joint operation with Ted Weiner and associates.

Northern Development Co., Edmonton, Alta., contractor on Hudson's Bay Oil & Gas Co.'s recent wildcat failure, 1 Winnifred, 30 miles west of Medicine Hat in southeastern Alberta Province, is moving rig to a second location, 13 miles further southwest, to be drilled for the same operator. The new location is in LSD 15, 3-10n-10w4.

Pike Drilling Co., Los Angeles, is starting work on two new California contracts, one for Basin Oil Co. at the latter's 7-2 Community in the Inglewood field, and the other for Merchants Petroleum Co. at 2 Bonebrake, Ventura field. At Inglewood, the same contractor is drilling Basin's 8-2 Community, which now is below 10,500 ft.

Coats & Hearrell Drilling Co., Longview, Tex., is contractor for A. O. Phillips on a wildcat test being started in the J. C. Robertson Survey, A-853, 3 miles northeast of Paluxy production in the Boynton field, Smith County, East Texas. Contract is for 8,000 ft.

Guy Maybee Drilling Co., Midland, Tex., has contract for Sunray Oil Corp. 1 Sentell, a wildcat test to be drilled in the J. P. Smith Survey, Scurry County, West Central Texas. The location is in Tract 2, Dallas Trust & Savings Bank subdivision, 2 miles east of production on the southeast side of the North Snyder field. Projected depth is 7,000 ft.

Scooter Drilling Co. is moving in for a well to be drilled for A. J. Hodges Industries, Inc., in the Sligo field, Bossier Parish, Louisiana. Contract is for 3,000 ft.

Big Chief Drilling Co., Oklahoma City, is rigging up at a new location staked by Warren Wright and Mohawk Drilling Co. on a Carter Oil Co. farmout in the Northeast New Hope pool, Garvin County, Oklahoma. The location is for 1 Evans et al., in 9-4n-3w.

H. & S. Drilling Co., Tulsa, is contractor for Barnsdall Oil Co. at the latter's 1 Mattie James, a newly started operation at East Longville, Beauregard Parish, South Louisiana. Location is in 35-5s-9w. Contract depth is 9,000 ft.

Helmerich & Payne, Inc., Tulsa, has been awarded contract by Westoak Gasoline Co. for two wells in the Elk City field, Beckham County, Oklahoma. Rig is being set up for 1 Cleo Walter, C SW NE 24-10n-21w. Work will start in the near future on 1 Lizzie Walter, C NW SE, same section.

Don Crosby Drilling Co., Houston, has started a 9,800-ft. test for Crown Central Petroleum Co. at 1 Dietz et al., near Iota, in 13-8s-2w, Acadia Parish, Louisiana Gulf Coast.

Newman Brothers Drilling Co., San Antonio, is contractor and joint operator with Alaska Steamship Co. and Calvert Corp. at a 7,200-ft. wildcat test being started on their H. H. Eiland lease in Section 202-97, H&TC Survey, 7 miles west of Snyder, Scurry County, Texas. Location is 2 miles northeast of the Diamond M field.

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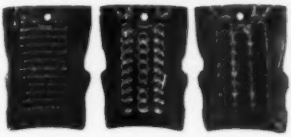

"Varco" buttons, popular for years in rotary drill pipe slips, proved satisfactory and have been adopted and are installed in segments of automatic casing spiders and elevators of various makes. Wickers are removed and holes bored for a maximum number of VARCO casing buttons, to assure uniform and maximum gripping area. Converting buttons for the next smaller casing are available. Write for complete descriptive data.

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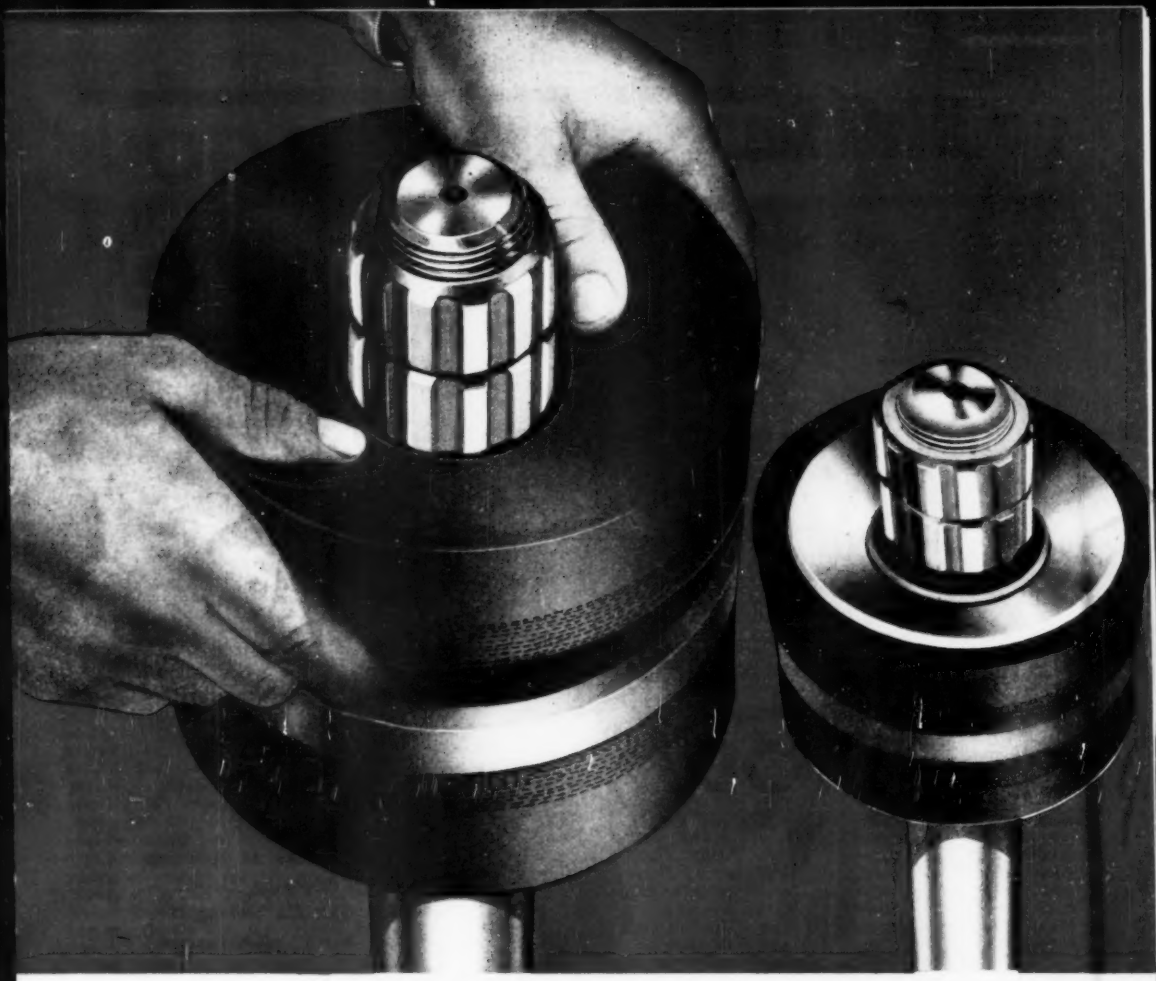

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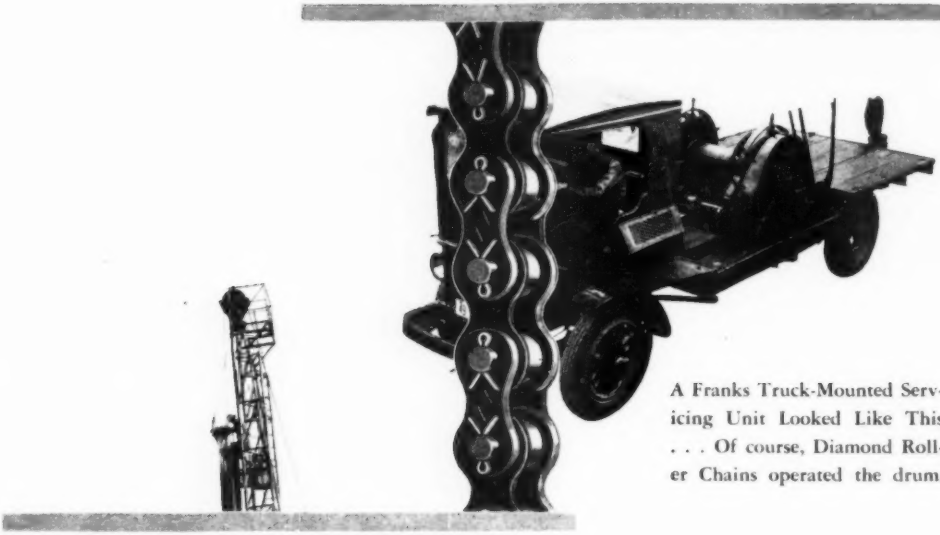

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Exploration and Drilling

How Should You Use Geophysics?

THE conventional answer to the above question is this. First you use a reconnaissance method or methods to cover a lot of territory quickly and cheaply. This enables you to eliminate most of the area as unpromising, and points up certain areas where anomalies are indicated. Then you pick out the most promising of these anomalies and detail them with a seismograph.

That probably would be the logical approach, if there was no such thing as competition. In a foreign country where you had an enormous concession and plenty of time, it might work out fine. But where you have competition there are some other angles. For one thing, by the time you get around to detailing with seismograph crews, everybody has a pretty good general idea of what you are doing and where. Therefore you either make a big land play on cheap acreage before you are too far along; or by the time you have been shooting, you pay through the nose for any leases you try to get. That is, you pay through the nose if some of your competitors haven't already grabbed the very leases you want the most.

Some of the older executive geologists who welcomed geophysics in the early days have different ideas. They claim that some of the early-day lessons have been forgotten. The trouble, they say, is that too long a time has elapsed from the time the geophysical and land play was first made. Not enough attention has been given to tracing the past history of the leases that are now producing most of the company's oil. If this were done, these geologists believe that many of their fellow executives would be surprised.

Conceding that it takes courage, this school of geologists argues that an executive geologist can do a lot with the information obtained from a fast reconnaissance with either gravity or magnetic instruments, or both. For instance, here is an area out ahead of the play. The geologist has certain ideas about what the regional geology might be. He surely must have some general ideas about what type of regional features could be present and what kind of traps might be associated with these features. Otherwise why be interested at all?

A quick going over with magnetic or gravity instruments, or perhaps both, is possible without stirring up too much interest outside, or jacking up acreage prices very much. Right after that comes the critical point. On the basis of geophysical reconnaissance information, the geologist must make a decision. Does this information confirm, modify, or repudiate his ideas about the regional geology? If it confirms it, or doesn't modify it too severely, what should he do?

Some geologists claim that the thing to do is to grab a big spread of leases at cheap prices along where you figure the trend will be. They claim that this has paid off many times in the past, and that it will continue to pay off in the future. That is, it will pay off if the original geological thinking was sound. There is also the point that this method broadens the geologist's margin of luck—and every good geologist admits that there is always an element of luck. A broad spread of cheap acreage will almost certainly have some leases prove up, if the trend itself produces.

From another angle, these same geologists claim that gravity and magnetic methods have other uses that are too often ignored. For instance a good magnetic survey can furnish a reasonably reliable estimate of the thickness of the sedimentary section in unknown territory. Furthermore, strange as it may seem, sometimes it is worth while checking seismic work with a reconnaissance method.

In a recent issue of "Geophysics," a case was cited. Seismic work had been done in an area and the data could be interpreted in either of two different ways. A magnetic survey of the area then revealed that one seismic interpretation would also fit the magnetic data, but that the other seismic interpretation could not possibly fit the magnetic observations. Neither magnetic nor gravity observations are capable of one and only one interpretation. But that doesn't mean that an unlimited number of interpretations will fit the observed magnetic or gravity data.

—Charles J. Deegan

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

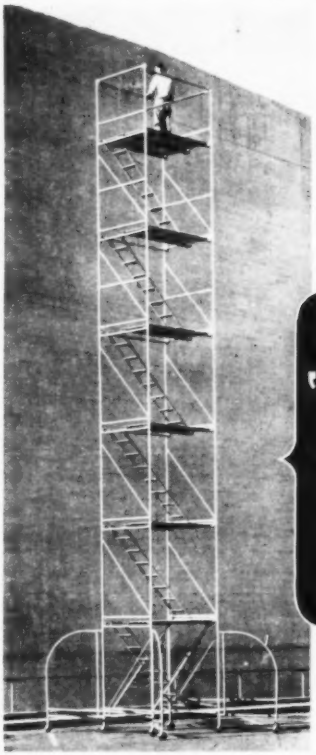
CALIFORNIA.—Standard of California's 5 Mushrush, in Wasco field of Kern County, is the new world's deepest producing well. It flowed 96 bbl. of 40.7 -gravity oil from an Eocene sand at 15,440-75 ft., a new pay for the field. Testing is being continued.

SOUTH LOUISIANA.—Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc., have discovered one of the best producers in the Louisiana tidelands, with the completion of their 1 State, Block 33, 2½ miles offshore from Cameron Parish. The well flowed 934 bbl. of 42.3°-gravity oil per day from the Miocene section at 10,390-10,408 ft. Total depth is 13,282 ft.

ROCKY MOUNTAIN AREA.—Superior Oil Co. has completed the world's deepest well (its Pacific Creek, Wyoming, dry wildcat) at a total depth of 20,521 ft. Atlantic Refining Co. swabbed 6 bbl. of 41.7 -gravity oil per hour at the Lightning Creek, Wyoming, discovery. Equity Oil Co. plugged Utah's deepest wildcat, its Thompson Unit, Grand County, at 13,767 ft., total depth.

WEST TEXAS.—Fullerton Oil Co. 1-D Kone, Pecos County wildcat, recovered 42 -gravity oil from top of the Ellenburger on a drill-stem test.

EAST TEXAS.—Midway between Cayuga and Long Lake field, Continental Oil Co. 1 Royall National Bank had good shows of a Rodessa distillate discovery.



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Mobile 45' unit takes only 15 minutes to erect!

Scores of petroleum industry users report big labor savings on tank painting, inspection, control, gaging and general overhead maintenance with Up-Right Scaffolds and Roll-Around Safety Cage.

Scaffolds are available in desired number of 6-foot and shorter section units for rapid, easy assembly. Roll easily from position to position throughout job. Stronger than structural steel yet one third the weight. Safety tread stairway completely within structure. No wrenches, wing nuts, bolts, loose parts. Each section folds flat.

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N. CENTRAL TEXAS

Apparent Jones County Hit Moves in Swabbing Unit

WICHITA FALLS — Walter Duncan and A. G. Hill have released information on their 1 Mrs. Bettie Burleson, prospective sand discovery 7 miles southwest of Anson in Jones County. A drill-stem test at 3,460-94 ft., open 1 hour and 12 minutes, gas showed in 6 minutes, and oil in 1 hour and 6 minutes. Recovery was 1,451 ft. of oil, plus 240 ft. of gas-cut mud, with no water.

Flowing pressure was 280 psi., and shut-in pressure 1,080 psi. Total depth was 3,610 ft., plugged back to 3,510 ft. At last report, operators had drilled plug on casing set to 3,600 ft., and were moving a swabbing unit. Location is in the J. W. McKissick Survey, Subdivision 12, and 2½ miles southeast of Bartlett field.

Parker County.—Buz Morgan et al 1 O'Neal, M. Waugh Survey, 3½ miles northwest of Springtown, had prospects of Ellenburger production, which was believed to be distillate. Top of the Ellenburger was 6,660 ft., drilled to 6,685 ft. When the well was opened after a 200-gal. mud acid treatment, and 2,000 gal. of regular acid, it kicked off without being swabbed. Tested through various sized chokes, it produced approximately 500,000 cu. ft. of gas daily, plus an unestimated amount of fluid. Tanks were being erected for further tests.

Location of the 1 O'Neal is 2 miles southeast of Daly Ellenburger distillate field of Wise County. The well was thought to be similar to the Daly discovery, in that both had a good show of oil in the Caddo, and neither had a show of oil in the Bend conglomerate. Later drilling in Daly field added the Caddo as a second pay.

Montague County.—Konrad Sztykgold 1 H. C. Bradley, Block 10, MEP&P Survey, 4 miles southeast of Nocona, recovered 75 ft. of free oil and 85 ft. of heavily oil-cut mud on a 52-minute drill-stem test in conglomerate from 5,509-14 ft. Bottom-hole pressure was 2,300 psi. Drilling continued below 5,562 ft. Nearest production is Dobson field, east of Nocona.

B. F. Phillips et al 1 Salona Methodist Church tract, Block 82, Titus County School Lands, northwest of the Salona townsite, was running electrical surveys before setting pipe to continue testing at Caddo. On a drill-stem test of the Caddo at 6,052-83 ft., recovery was 3,750 ft. of clean oil and 120 ft. of heavily oil-cut mud. Length of the test was not reported. A second test in conglomerate from 6,141-45 ft., recovered 25 ft. of gas-cut mud in 1 hour. Total depth was 6,290 ft.

Three miles west of Montague, Bluff Creek Oil Co. 1 Tony Fenoglio, C. C. Milne Survey, A-485, flowed at the rate of 85 bbl. of oil an hour, for 5 hours, after being swabbed in. The well made successful drill-stem tests in the conglomerate section at 6,130-56 and 6,186-6,210 ft. Recovery was not reported. Location is an outpost to Minor field.

Wise County.—Akin & Dimock 1 Wages, Section 63, Matagorda CSL, 5 miles southwest of Paradise, was waiting on orders after a 1-hour drill-stem test in unidentified lime at 3,728-48 ft. Recovery was 600 ft. of gas-cut mud, under flowing pressure of 375 psi.

J. C. Mann, Jr., et al 1 Hamilton, Becknell Survey, 2 miles southeast of Chico field, was waiting on orders after recovering 555 ft. of mud, slightly cut with gas, on a drill-stem test at 5,915-50 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Montague County: C. U. Bay 1 D. C. Gregory, Sec. 28, W. A. Payne Sur., A-118, 5 mi. SE Montague, pumped 82.3 bbl. 43°-gravity oil a day, perforated 6,165-90 ft., TD, GOR 800 cu. ft.

Wilbarger County: G. M. Shaner 1 J. J

FRIO SANDS IN ROCHE FIELD
REFUGIO COUNTY, TEXAS

Mud (Water & Clay) R_m = 0.75 ohm at BHT
Bit Size 10¾"
Spacings AM = 16"
AM' = 63"
AO = 24'

1

This is the first in a series of interpreted electrical logs from identified formations and fields which Schlumberger will reproduce in this publication. If you would like to keep this entire series, please write to us on your letterhead and we will be glad to send you a reprint of this log and a binder in which you may file subsequent logs as they are published. This series is made possible through the courtesy and cooperation of the oil operators who have released these logs.

LOG ANALYSIS

1) Water saturation S

R_O = 0.4 ohm in "X". This value will be used for "B" and "C" sands calculations.

In "B" Sand: $S = \sqrt{\frac{0.4}{29}} = 12\%$ approx.

In "C" Sand: $S = \sqrt{\frac{0.4}{12.5}} = 18\%$ approx.

2) Formation water resistivity R_w

$$SP = -90 \log_{10} \frac{R_m}{R_w}$$

At water level, in "X", SP = −115 mv.
thus, R_w = 0.04 ohm BHT

3) Porosity p

$$F = \frac{R_o}{R_w} = \frac{0.4}{0.04} = 10$$

$$p = \sqrt[m]{\frac{1}{F}} = 28\% \text{ for } m = 1.8$$

CORE ANALYSIS

B Sand	Porosity	30%
	Permeability	800 md.
	Residual Water	43%
C Sand	Porosity	30%
	Permeability	800 md.
	Residual Water	42%

PRODUCTION RESULTS

Perforated: 6833-42 with 24 shots
Potential: 140 bbl. oil 28.3° API
Gas oil ratio 758/1

SCHLUMBERGER
WELL SURVEYING CORP.
HOUSTON, TEXAS

Baker, 29-5-H&TC, 3 mi. S Electra, pumped 18.7 bbl. 41°-gravity oil a day, perforated 1,931-35 ft., TD 2,560 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Fortex Oil Corp. 3 J. R. Parkey "A," Sec. 4, Blk. 1, ATNCL Sur., 3 mi. SE Mankins, dry, TD 1,709 ft.

Baylor County: M. W. Blair 1 Dottie Portwood, Sec. 1375, 2 mi. NW Spring Creek, dry, TD 1,425 ft.

M. W. Blair 3 Mrs. Dottie S. Portwood, Sec. 1280, TE&L Sur., 3½ mi. SW Megargel, dry, TD 1,440 ft.

Brown County: A. J. Bankhead 1 Beaulah Carmichael, Lot 1, Patrick McGee Sur. 649, 5 mi. S Cross Cutt, dry, TD 2,293 ft., Caddo 2,000 ft., had light odor.

Coleman County: Guy Mabee 1 Curtis Beck, Sec. 36, GH&H Sur., 3 mi. SE Talpa, dry, TD 3,236 ft.

Comanche County: Denhart & Hazar 1 H. F. White, Warren J. Mitchell Sur. 6, A-640, 1 mi. SE Zourette, dry, TD 755 fft.

Haskell County: Thomas D. Humphrey 1 E. O. Chapman "B," Sec. 60, H. Tidwell Sur., A-385, 6 mi. NE Haskell, dry, TD 5,349 ft., DST 4,228-46, 4,245-55, recovered gas, oil-cut mud, SIP 450 psi in 30 minutes.

Jack County: S. D. Johnson 1 W. R. Johnson, C. Vandever Sur., 1¼ mi. SE Lester "F" well, 4 mi. NW Jacksboro, dry, TD 5,620 ft.

Montague County: S. D. Johnson 1 W. A. Reynolds, Blk. 51, J. H. Belcher Subd., 1 mi. SE Belcherville, dry, TD 5,712 ft., Caddo 5,417 ft., conglomerate 5,468 ft.

Shackelford County: H. R. H. Drilling Co. 2 Dell Newell, Sec. 59, ETRR Sur., 3½ mi. NW Albany, dry, TD 1,280 ft.

Terry Hudson 1 T. W. Lee, Sec. 31, Blk. 11, T&P, 7 mi. SW Albany, dry, TD 908 ft., sand with oil show 895-903 ft.

Ben H. Schkade 1 Walter P. Humber, Sec. 12, BAL Sur., 5 mi. SE Albany, dry, TD 760 ft.

Stephens County: Fleming Oil Co. 2 J. Q. Corbett, 2-3-SPRR, 4 mi. SE Ivan, dry, TD 4,767 ft., Ellenburger 4,602 ft., elevation 1,195 ft.

Star Oil Co. 1 Ed Ford "I," Sec. 1, SPRR Sur., A-207, 14 mi. N Caddo, dry, TD 4,890 ft., Caddo 3,415 ft., elevation 1,137 ft., DST 4,704-14 ft. recovered oil-cut mud, DST 4,712-84 ft. recovered gas-cut mud, no pressure.

Wichita County: Coppock & Coleman, Sec. 31, H&GN Sur., A-160, 5 mi. NW Iowa Park, dry, TD 2,231 ft.

Wise County: J. C. Man, Jr., Hankamer & Rodgers 1 J. D. Hamilton, W. Becknell Sur., A-38, 1 mi. W Chico, dry, TD 5,950 ft., Caddo 5,239 ft., conglomerate 5,345 ft., had some shows of gas.

Young County: Davis & Davis 1 J. R. Womack, Sec. 2449, TE&L Sur., ¾ mi. E Spring Creek, dry, TD 1,270 ft.

APPALACHIAN FIELD

West Virginia Tests Find Oriskany Gas

PITTSBURGH.—Three wildcat wells were completed in Steele district, Wood County, West Virginia, with fair open flow: Limestone Gas Co. 1 L. W. Pfalzgraf gaged 746,000 cu. ft. of gas; Godfrey L. Cabot, Inc., 1-1300 Benjamin Quick, 622,000 cu. ft.; United Carbon Co. et al 1-1633 P. E. Province, 389,000 cu. ft. All three wells were shot in the Oriskany sand and the results noted were after shooting. In Pocatalico district, Putnam County, Godfrey L. Cabot, Inc., 40-1298 J. L. McLean Heirs, deep well, is running 5½-in. casing at 4,870 ft. in the Corniferous lime which was topped at 4,855 ft. In Glade district, Webster County, Hope Natural Gas Co. 9227 West Virginia & Pittsburgh Railroad Co., elevation 2,512 ft., has resumed drilling and it a depth of 7,288 ft., 14 ft. in the Oriskany sand. In Reno district, Preston County, Snee & Eberly 1 Dola E. Dever, elevation 1,508 ft., is drilling at 5,401 ft.

Operations in southwest Pennsylvania included: Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jessie B. Miller, elevation 1,666 ft., drilling at 4,197 ft.; Georges Township, Fayette County, Orville Eberly et al 1 N. E. Murphy, at 945 ft., and in Wharton Township, William E. Snee et al 3 Indian Creek Coal & Coke Co., elevation 2,615 ft., drilling at 5,738 ft.; Derry Township, Westmoreland County, Peoples Natural Gas Co. 4-3814 Camilla Giffen, elevation 2,238 ft., drilling at 8,813 ft.

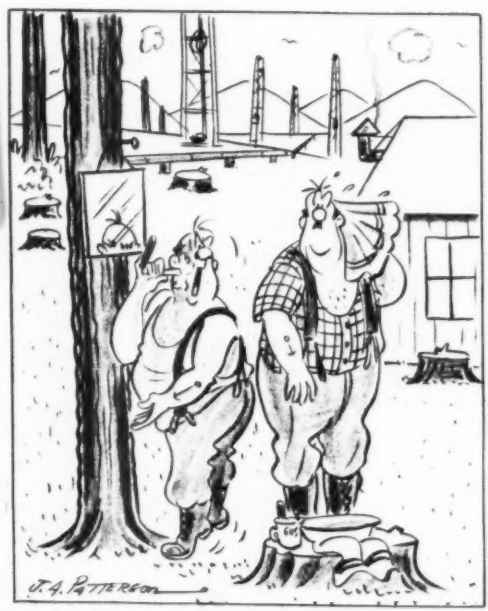
There were 16 new locations in West Virginia, and 2 in southwest Pennsylvania, for the week.

WEST VIRGINIA SUCCESSFUL WILDCATS

Wood County, Steele district: Limestone Gas Co. 1 L. W. Pfalzgraf, 746,000 cu. ft. of gas, Corniferous lime 4,933 ft., Oriskany sand 5,044 ft., gas 5,047-5,057 ft., TD 5,085 ft.

Godfrey L. Cabot, Inc., 1-1300 Benjamin Quick, 622,000 cu. ft. of gas, rock pressure 1,780 psi., Corniferous lime 4,945 ft., Oriskany sand 5,053-5,100 ft., gas 5,053-5,060 ft., TD 5,103 ft.

United Carbon Co. et al 1-1633 P. E. Province, 389,000 cu. ft. of gas, rock pressure 1,375 psi., Corniferous lime 4,974 ft., Oriskany sand 5,097-5,126 ft., gas 5,069 ft., TD 5,226 ft.



THE OIL AND GAS JOURNAL

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and

ROOT PETROLEUM COMPANY

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Tennessee Division:
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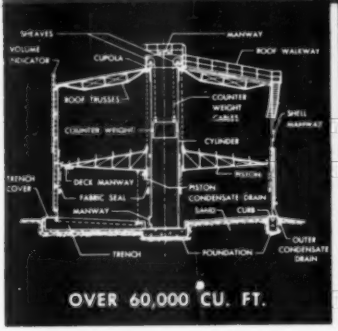
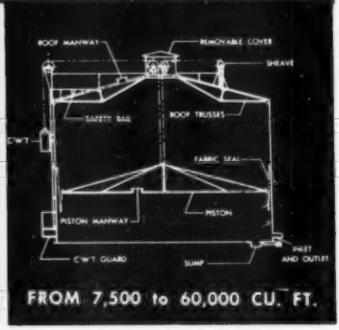
WIGGINS *Dry Seal* GASHOLDERS



OVER 60,000 CU. FT.



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SOUTHWEST TEXAS

New Gas-Condensate Field Opened in Kleberg County

CORPUS CHRISTI—A new gas-condensate field has been opened in Kleberg County with the completion of Humble Oil & Refining Co. G-1 King Ranch-East Laureles. On drill-stem test at 6,497-505 ft. the well recovered 20 ft. of distillate and developed 380 psi. working pressure. The field has been named Laguna Largo and is located in the Rincon de los Laureles Grant, 16 miles south of Corpus Christi.

W. F. Calohan and R. F. Campbell recovered 600 ft. of slightly oil-cut brackish water after running drill-stem test at 2,364-70 ft. on the 1 Yeager-Armstrong et al. Well is located in the Los Animas Grant, Abstract 2996, Webb County. Operators are now drilling ahead at 2,840 ft.

Humble Oil & Refining Co. 5 Santa Fe Ranch promises to be a new discovery for Hidalgo County. On drill-stem test at 7,195½-204 ft. the well recovered 30 ft. of 56 -gravity condensate and flowed 3,450 M.c.f. of gas after developing 142 psi. pressure. Operators are drilling ahead at 7,374 ft.

Jessie I. White 1 Martin McDonald, new oil discovery in the M. Baker Survey, Bastrop County, is waiting on potential gage after registering an initial flow of 106 bbl. of oil through ¼-in. choke from open hole at 1,873-81 ft.

A new shallow discovery 2 miles south of Martindale, Caldwell County, is Fred J. Adams 1 Mrs. Fred J. Adams, which gaged 23 bbl. of 36 -gravity oil per day on pump from open hole at 671-704 ft. The top of the pay zone is 680 ft. and total depth is 704 ft. The new field will be called Staples.

The Texas Co. 3 Samuel D. Bloomberg et al, wildcat in Porcion 41, Abstract 77, Starr County, promises to open a new gas pool for that area. On drill-stem test at 4,037-48 ft., the well recovered gas-cut mud and condensate, and developed 600 psi. working pressure while flowing gas-condensate. Operators are coring ahead.

The 26 new locations in Southwest Texas include 4 wildcat starts, 1 each in Dimmit and Webb counties, and 2 in San Patricio County. There were two successful exploratory tests completed, one each in Duval and Brooks counties, while four were dry, one each in Guadalupe, Aransas, Duval, and Hidalgo counties.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Brooks County: Gas-condensate discovery—Humble Oil & Refining Co. 1 R. J. Kleberg, Jr., Trustee, in Viboras Pasture Sur. 82, 7 mi. E of Encino, top sand 8,123 ft., TD 10,382 ft., perf. 8,23-35 ft., IP: 2,100 M.c.f. of gas per day on open flow, plus 25 bbl. distillate, 55.6 gravity.

Duval County: Gas discovery—J. W. Cosner 1 W. K. Hoffman, in Sur. 116, just E of N end of Hoffman field, 7 mi. SE of Freer, top sand 2,005 ft., TD 2,067 ft., perf. 2,005-26 ft., IP: 4,000 M.c.f. of gas per day, open flow, SIP 700 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Western Natural Gas Co. 1 St. Charles Ranch Co., in A. B. Pedigo Sur., A-235, 5¾ mi. NE of Lamar, dry; TD 8,512 ft.

Duval County: American Republics Corp. 4 The Duwel Co., in J. Poitevent Sur. 550, 2½ mi. W of Rosita field, dry; TD 4,012 ft.

Guadalupe County: J. M. Turkel B-1 J. B. Burns, in Samuel Highsmith Sur., 2 mi. W of Luling, dry; TD 2,648 ft.

Hidalgo County: Continental Oil Co. 1 M. L. Talbot, in Section 15, West Addition to Sharyland subdivision, 2 mi. N of Mission, dry; TD 11,011 ft.

CANADIAN FIELDS

Canadian Gulf Stakes New Wildcat in Stettler Area

CALGARY.—Canadian Gulf Oil Co. has staked location for another wildcat in the Settler area, about 80 miles northeast of Calgary. The new venture, Gulf-G. E. Upton 1, LSD 1, 11-34-21w4, is located on a Crown reservation held by Western Canadian Oil Co., a Gulf subsidiary holding company. Parker Drilling Co., contractor, is moving on location, situated about 24 miles south and 4½ miles west of the company's Ellis 1 dual-zone Devonian oil discovery well.

Meanwhile, Gulf-E. Bauer 4, LSD 4, 34-37-20w4, about 1 mile south of the discovery, is drilling at 5,229 ft., nearing D2 zone of the Devonian.

The team of three Calgary independents, a Toronto independent and Canada's biggest major oil company, that attained a Viking Sand oil discovery at Joseph Lake, about 18 miles southeast of Edmonton, has started at its first follow-up well. Owned by General Petroleum, Superior Oils, and Kroys Oils of Calgary; Jupiter Oils of Toronto; and Imperial Oil, Ltd., the new venture, Superior-Joseph Lake 2, LSD 14, 22-50-22w4, is located ¼ mile north of the discovery. The discovery well, Superior-Joseph Lake 1, producing from the 1-ft. interval 3,264-65 ft. in the Viking sand, yielded 9,181 bbl. of 37° to 38°-gravity crude from the period March 31 to August 30 of this year. On test run near the end of March the well rated an indicated potential of 500 bbl. daily, although during the last 5 months it has been produced at an average rate of 60 to 75 bbl. daily.

The Viking sand is a major source of natural gas reserves on the plains of Alberta, but the Joseh Lake venture is the first well to strike oil in commercial volume from that formation.

Lloyd Petroleum Drillers report that results indicate commercial natural gas has been discovered at a wildcat near Wilkie, Sask., about 75 miles southeast of Lloydminister. The well, Wilkie 1, LSD 10, 32-39-19w3, about ½ mile south of the town of Wilkie, encountered the Viking sand horizon and ran a drill-stem test of the section 1,845-51 ft., receiving an unmeasured gas blow plus a pipe recovery of 300 ft. of gasified mud. Drilling proceeded to the Colony said and oil stains showed in the interval 1,995 to 2,005 ft. The well is now bottomed at 2,406 ft. near top of the Devonian. It is planned to carry the hole down another 50 ft. prior to running 7-in. casing and further testing being carried out. Gravity of oil shown in cores appeared to be similar in quality to that at Lloydminister (a heavy black crude with gravity range around 8 to 18° gravity A.P.I.)

Royalite Oil Co. of Calgary is taking immediate steps to commence exploratory work on Graham Island, one of the Queen Charlotte group off the coast of British Columbia.

Drilling of a test well and further geological survey work is to be carried out on a permit area of approximately 230,000 acres, held in the name of Britalta Petroleums, Ltd., a privately owned British Columbia company. Rights to operate under this permit have been assigned to Royalite Oil Co.

Royalite currently has a geologist on Graham Island making a preliminary survey. The company intends to spud its initial test wells in B. C. as soon as a drilling rig can be shipped to the location.

Manitoba's second deep test wildcat well, Souris Valley R. W. Moore 1, LSD 5, 20-1-27wP meridian, near Coulter Post Office, in the southwestern corner of the province, was spudded August 26, and at last report was making hole below 3,000 ft. Completion depth is slated at around 6,000 ft., or pre-Cambrian formation, whichever is reached first.

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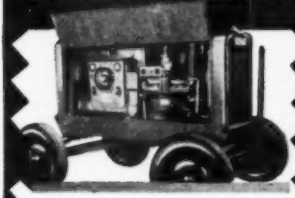

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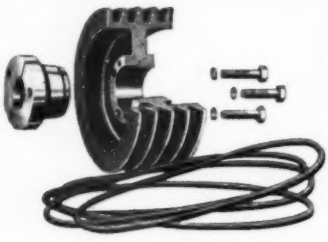

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Devonian top is expected around 3,300 ft., based on information gained at the Souris Valley 1 well, LSD 14, 14-1-28wP meridian.

CANADIAN WILDCAT FAILURES

Redwater Consolidated 4, LSD 4, 8-61-23w4; TD 4,095 ft.

Westates-Scott 1, LSD 7, 6-16-12w4; TD 4,262 ft.

KANSAS

Lyon County Wildcat Gets Good Showings in Lansing

LYON County, in East Central Kansas, where a large virgin area awaits exploration and development, came into the spotlight during the week with indications pointing to the discovery by J. M. Huber Corp. of a new pool in a rank wildcat test being drilled about 6 miles northwest of Emporia, the county seat.

The wildcat, 1 Ball, NW SW NW 23-18s-10e, encountered promising saturation in the Lansing-Kansas City lime, and in a drill-stem test of an interval at 1,604-18 ft. blew gas in 15 minutes and recovered 5 ft. of clean oil with an additional 85 ft. of heavily oil-cut mud. Testing tool was open 1 hour. Top of the Lansing was logged at 1,261 ft. (—19 ft.).

Two other drill-stem tests were made, one at 1,577-97 ft. and the other at 1,618-25 ft. However, in these the results were not favorable, although the intervals had shown some oil in drilling. In the former, the recovery was only 30 ft. of drilling mud, while in the latter salt water with a slight oil show was obtained. Operators now are drilling ahead in exploration of lower horizons.

Nearest oil production is in the Atyeo pool, about 18 miles to the south on the Lyon-Greenwood County line. The discovery is about 25 miles south of the recently opened Davis Ranch pool in Wabaunsee County, where Carter Oil Co. is developing production found in the Viola lime. To the west in Chase County is some gas production, the nearest being in the Altemas field, about 12 miles distant.

Texas Pacific Coal & Oil Co. has another prospective pool-opener in McPherson County in its 1 Peterson, NW SW NE 17-18-2, which is testing Simpson dolomite, topped at 3,389 ft. (—1,868 ft.). Total depth is 3,392 ft. with 5-in. casing at 3,387 ft. When plug was drilled, oil rose 200 ft. in the hole. In a previous drill-stem test of the section at 3,386-92 ft., 30 ft. of clean oil was recovered. The discovery is 2 miles northeast of the McPherson pool and about 3 miles southwest of Bonaville pool, opened about 3 weeks ago by the same operators, and producing from the Simpson sand at 3,557-70 ft.

In the northwestern part of Ellis County, Derby Oil Co. and Nate Appleman recovered 300 ft. of free oil and 510 ft. of heavily oil-cut mud in a 30-minute drill-stem test in the Lansing at their 1-A Warren, NW NW NE 12-11-20, a wildcat about 3 miles south of the Berland pool, Rooks County, but are drilling ahead to the Arbuckle. Interval tested was at 3,442-66 ft. with top of the Lansing at 3,414 ft. (—1,270 ft.).

A possible Kinderbrook discovery in Pratt County is indicated at Champlin Refining Co. 1 Moore, NW NW SW 14-26-14, 2 miles southwest of the Moore pool. A drill-stem test of this zone at 4,285-4,300 ft. (—2,403-18 ft.) resulted in a recovery of 75 ft. of oil-cut mud. Following the test, hole was drilled to 4,535 ft. in the Arbuckle, topped at 4,502 ft. (—2,520 ft.), but has been plugged back to the bottom of the Kinderbrook with 5-in. casing run to 4,281 ft.

Atlantic Refining Co. 1 Hoffman, NW NE NE 32-18-6, northeastern Rice County wildcat, swabbed 4 bbl. of oil per hour in a 5-hour test to open another new Lansing-Kansas City pool. Production is from casing perforations at 3,092-98 ft., with top of the Lansing at 2,747 ft. (—1,080 ft.). Casing was run to 3,599 ft. in the Arbuckle, topped at 3,578 ft., but no tests were made in the latter formation.

KANSAS SUCCESSFUL WILDCATS

Butler County: Dorsey Hager and Federal Royalty Co. 1 Reiserer, SW SW NW 15-26s-7e, pumped 28 bbl. of oil per day from Mississippian at 2,770-2,887 ft., Kansas City 2,120 ft., basal Mississippian 3,100 ft., Viola 3,161 ft., TD 3,167 ft.

Russell County: J. L. Drilling Co. 1 Mumler, NW SW SW 16-14s-13w, pumped 4 bbl. of 40°-gravity oil per day from Tarkio at 2,408-34 ft.; anhydrite 824 ft., TD 2,434 ft.

Stafford County: Musgrove 1 M. L. Hart, SW SW NE 36-22s-14w, pumped 472 bbl. of 35°-gravity oil per day from Arbuckle at 3,830-32 ft.; Heebner 3,316 ft., Toronto 3,332 ft., lime 3,445 ft., Lansing 3,462 ft., Viola 3,747 ft., Simpson 3,775 ft., TD 3,832 ft.

KANSAS WILDCAT FAILURES

Barber County: Aladdin Petroleum and Cooperative Refinery Assn. 1 Kincaid, SW NE NW 15-34s-14w, dry, TD 5,478 ft., Elgin sand 3,887 ft., Douglas sand 4,060 ft., Lansing 4,188 ft., basal Kansas City 4,637 ft., Mississippian 4,815 ft., Chattanooga 5,131 ft., Misener 5,180 ft., Viola 5,184 ft., Simpson shale 5,313 ft., Simpson sand 5,340 ft., Arbuckle 5,426 ft.

Butler County: Thrifty Drilling Co. et al 1 Carl Hines, NW SW SE 7-29s-3e, dry, TD 3,310 ft., Kansas City 2,475 ft., Mississippian 2,962 ft., Simpson sand 3,292 ft.

Douglas County: Gerlad Neuner et al 1 Emmitt, C NW 4 6-14s-18e, dry, TD 2,832

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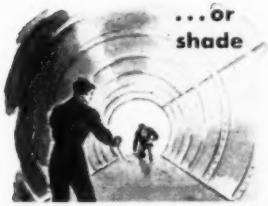

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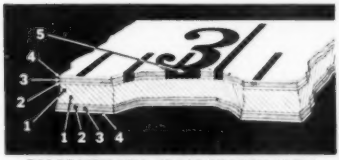

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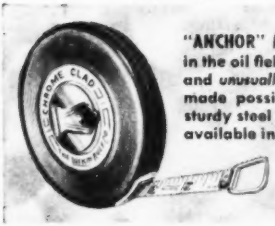

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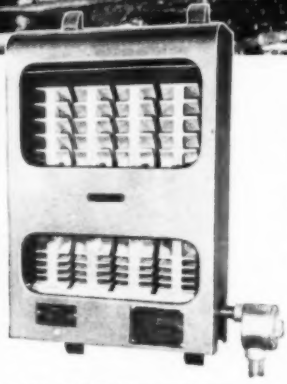

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Ellis County: Sohio & Veeder 1 Keagy, NW NW SW 32-11s-20w, dry, TD 3,900 ft., anhydrite 1,620 ft., Topeka 3,245 ft., Heebner 3,467 ft., Lansing 3,506 ft., basal Kansas City 3,749 ft., conglomerate 3,795 ft., Simpson 3,857 ft., Arbuckle 3,867 ft.

Harvey County: Dorsey Hager 1 Hupp, SW NE SE 14-23s-1w, dry, TD 3,591 ft., Lansing 2,310 ft., Kansas City 2,638 ft., Mississippian 3,024 ft., Kinderhook 3,320 ft., Hunton 3,420 ft., Viola 3,440 ft., Simpson 3,537 ft.

McPherson County: W. L. Hartman 1 Reimer C W 2 W 2 W 2 35-20s-1w, dry, TD 3,488 ft., Mississippian 2,925 ft., Viola 3,442 ft., Simpson shale 3,479 ft.

Rush County: John Lindas et al 1 Knotts, NE NE NE 30-19s-19w, dry, TD 4,741 ft., anhydrite 1,484 ft., Heebner 3,793 ft., Toronto 3,810 ft., Lansing 8,838 ft., Marmaton 4,114 ft., sandy conglomerate 4,301 ft., cherty conglomerate 4,350 ft., Mississippian 4,440 ft., Viola 4,608 ft., Simpson shale 4,698 ft., Simpson sand 4,702 ft., Arbuckle 4,711 ft.

Russell County: Bennett & Roberts Drilling Co. 1 Daube, SE SE NW 12-13s-13w, dry, TD 3,275 ft., anhydrite 568 ft., Topeka 2,570 ft., Heebner 2,716 ft., Lansing 2,720 ft., basal Kansas City 3,075 ft., Marmaton 3,102 ft., conglomerate 3,128 ft., Simpson 3,205 ft., Arbuckle 3,243 ft.

Stafford County: Delta, Harms & Knight 1 Elba Ward, SE SE SE 15-23s-13w, dry, TD 3,939 ft., anhydrite 768 ft., Heebner 3,277 ft., Lansing 3,434 ft., Viola 3,769 ft., conglomerate 3,720 ft., Simpson 3,853 ft., Arbuckle 3,909 ft.

W. L. Hartman 1 Jordan, NW NW SE 26-24s-12w, dry, TD 4,132 ft., anhydrite 665 ft., Topeka 3,012 ft., Heebner 3,324 ft., lime 3,477 ft., Lansing 3,507 ft., Viola 3,936 ft., Simpson 4,039 ft., Arbuckle 4,100 ft.

MISSISSIPPI

New Condensate Pool In Jefferson County

JACKSON—A new condensate pool has been opened in Jefferson County, with the completion of Danciger Oil & Refining Co. 1 Mrs. Kate S. Logan. The new producer flowed 62 bbl. of 52°-gravity condensate per day, plus 780 M.c.f. of gas through 9 64-in. choke with 2,400 psi. tubing pressure. The well was drilled to a total depth of 9,456 ft., and production is through perforations at 9,452-56 ft. in the Massive sand. The new producing area has been designated as the Rodney field.

Stanolind Oil & Gas Co. 1 J. B. Dockery, 17-10n-2e, Jefferson County, failed to flow continuously on 24-hour test. Operator has decided to install pumping equipment, and well is now shut in.

The closely watched Big Chief Drilling Co.-W. B. Osborn 1 George Ziegler, 2-6n-7e, Lincoln County, has been officially abandoned as dry at 10,660 ft.

Red Wing Drilling Co. and W. C. Proctor have announced location for a test in 32-10n-11e, Jones County. The wildcat will be a southeast offset to Danciger Oil & Refining Co. 1 Torry Smith, which was completed in May at total depth of 7,518 ft. as dry. This well cut a core in the lower Eutaw from 6,657-67 ft. with recovery being 10 ft. of firm sand with good gas odor and condensate taste.

Gulf Refining Co. has commenced drilling on 1 Brooks-Scanlon, Inc., wildcat in 36-5s-10e, Lafayette County, Florida. The present venture is in the Ocala Uplift area, in which a number of tests can be drilled for the cost of one Sunniland zone test.

The 8 new locations in Mississippi in-

clude 2 wildcat starts, 1 each in Jones and Walthall counties. There was one successful exploratory test completed in Jefferson County, while two were dry, one each in Lincoln and Wayne counties.

MISSISSIPPI SUCCESSFUL WILDCAT

Jefferson County: New gas-condensate discovery—Danciger Oil & Refining Co. 1 Mrs. Kate S. Logan, 18-10n-1w, top sand 9,452 ft., TD 9,456 ft., perf. 9,452-56 ft., IP: 62 bbl. condensate daily, plus 875 M.c.f. of gas, TP 1,275 psi. 11/64-in. choke, 52° gravity.

MISSISSIPPI WILDCAT FAILURES

Lincoln County: Big Chief-W. B. Osborn 1 George Ziegler, 2-6n-7e, dry; TD 10,660 ft.

Wayne County: Walter E. Sistrunk & Harris & Payne 1 Lee Clark, 24-9n-6w, dry; TD 5,006 ft.

GEORGIA WILDCAT FAILURE

Calhoun County: C. E. Walters 1 J. W. West, 4th Land district, Lot 328, dry; TD 1,365 ft.

OKLAHOMA

Black Oil Field Discovery Indicated in Lincoln County

DISCOVERY of a heavy, black oil pool in Lincoln County is indicated at The Texas Co. 1 M. M. Watson, SE NE NE 9-12n-3e, which, in a drill-stem test of a Pennsylvanian sand at 4,802-85 ft., recovered 3,500 ft. of oil with an additional 1,000 ft. of mud. Oil is 22° A.P.I. gravity. Bottom of the hole is in Sylvan shale at 5,190-97 ft. Operators have run 7-in. casing through the Pennsylvanian sand to 5,001 ft. The string has a millable section opposite the indicated pay zone at 4,870-4,906 ft. Nearest production is in the Southwest Meeker pool, 5 miles to the southeast.

James H. Snowden and associates 1 Zimmerman, SW NW SW 31-10n-1w, a wildcat southeast of the small Southeast Moore pool, Cleveland County, flowed an estimated 1,500,000 to 2,000,000 cu. ft. of gas per day and 3 to 4 bbl. of fluid per hour in testing sandy dolomite, in which casing, cemented at 7,264 ft., was perforated at 7,110-80 ft. Pay was acidized with 1,000 gal. but is being reacidized in an attempt to improve production. Total depth is 7,325 ft.

In northeastern Kay County near an old well which produced from 14 to 15 bbl. of oil per day for several months before going dead, Dave Morgan is reviving production in his 1 Cales, C N½ NE SW 20-27n-4e. In Bartlesville sand at 3,200-30 ft., the well flowed an estimated 1,000,000 cu. ft. of gas and 10 to 12 bbl. of oil per day. The original well was bottomed at 3,867 ft. in the same sand. The area is about 4 miles northeast of the West Uncas pool and about 2 miles northeast of the Uncas townsite.

A possible ½-mile south extension of the Hewitt pool, or a new area, is indicated at George B. Blacklock and associates 1 Dillard, SW NW SW 27-4s-2w, Carter County. Although being drilled as a "tight" hole, the well is reported to have recovered approximately 2,000 ft. of oil and 300 ft. of oil-cut mud in a drill-stem test. Indicated depth of the test was 3,000-50 ft. Operators are drilling ahead.

In southeastern Creek County, Creek-more-Rooney and H. & M. Development Co. have a possible new pool in their 1 Fisher, NW NE SE 31-15n-10e. A cable tool test, the well bailed 10 bbl. of oil in 16 hours from the Red Fork sand at 2,210-25 ft., and has run casing for completion. It is 1½ mile east of the Northeast Newby pool and about a mile southwest of an abandoned producing area which once was a part of the Southwest Slick pool.

OKLAHOMA SUCCESSFUL WILDCATS

Pontotoc County: New pool, "Bebee, Southeast"—McBride, Inc., 1 Braly est., NE NW NE 9-4n-5e, flowed 315 bbl. of 37° gravity oil per day from Viola at 2,052-59 ft.; TD 3,361 ft.

Pottawatomie County: New pay in "Tecumseh,"—Stanolind-Amerada 1 Billington "B," SW SE SW 32-9n-3e, flowed 50 bbl. of oil per day from Hunton at 4,792-4,960 ft.; TD 5,320 ft.

OKLAHOMA WILDCAT FAILURES

Adair County: Youngblood 1 Howard, NE NW NW 36-18n-24e, dry, TD 405 ft.

Beckham County: Union Producing Co. 1 Music "B," C NW NE 26-10n-21w, dry, TD 10,556 ft.

Carter County: Simpson-Fell 4 Voorhees, S-2 SE NE 9-4n-2w, dry, TD 4,000 ft. (geological wildcate).

Kirkpatrick 1 Fish, NE NW SW 9-5s-1w, dry, TD 4,555 ft.

Cleveland County: Faultline 1 Bruesch, NW SE 2-9n-2w, dry, TD 7,425 ft., Pawhuska 3,170 ft., lower Pawhuska 3,570 ft., Hoover 3,995 ft., Oread 4,390 ft., Tonkawa 4,450 ft., Belle City 4,700 ft., Tonkawa Layton 4,900 ft., Hogshooter 5,305 ft., lower oolitic 5,740 ft., conglomerate 5,980 ft., Oswego 6,350 ft., Prue 6,340 ft., Bartlesville 6,550 ft., Hunton 6,605 ft., Chimney Hill 6,810 ft., Sylvan 6,910 ft., Viola 7,020 ft., dolomite 7,140 ft., sandy dolomite 7,373 ft., second Wilcox 7,408 ft.

Cotton County: Producers Oil & Gas 1 Bull, NE SW SW 8-2s-10w, dry, TD 2,328 ft.

Kewanee 1 Nan-Ni, NW NW NE 14-4s-11w, dry, TD 2,606 ft., conglomerate 1,259 ft., sand 1,730 ft., fusilinid lime 1,934 ft., Megargel lime (?) 2,009 ft.

Hughes County: Atlantic 1 Stephenson, NE NE NW 15-6n-9e, dry, TD 5,449 ft., Calvin 450 ft., Senora dolomite 844 ft., Senora sand 854 ft., Thurman 2,140 ft., lime 2,526 ft., Booch 2,643 ft., second Booch 2,802 ft., third Booch 2,980 ft., Gilcrease 3,250 ft., sand 3,260 ft., 3,323 ft., 3,445 ft., 3,575 ft., and 3,623 ft., sand and shale 3,650 ft., Wapanucka 3,880 ft., Cromwell 4,272 ft., Caney 4,407 ft., Mayes 4,900 ft., Woodford 5,020 ft., Hunton detrital 5,135 ft., Sylvan 5,136 ft., Viola 5,236 ft., dense 5,251 ft., dolomite 5,292 ft., Wilcox 5,360 ft., dolomite 5,391 ft., second dolomite 5,430 ft.

Mora Drilling 1 Dolton, SW NW SE 4-7n-10e, dry, TD 3,597 ft., Senora lime 670 ft., Senora sand 710 ft., Inola 1,785 ft., Bartlesville 1,790 ft., lime 2,265 ft., Booch 2,500 ft., Hartshorne 2,667 ft., Gilcrease 2,940 ft., Wapanucka 3,263 ft., Cromwell 3,537 ft.

Kiowa County: Sellars & Ewing 1-A Carter (was formerly Lewis), NE NE NE 11-6n-14w, dry, TD 1,390 ft. in shale.

Lincoln County: Aurora Gasoline Co. 1 Collier, SW SE NE 7-13n-5e, dry, TD 4,920 ft., Woodford 4,637 ft., Hunton 4,699 ft., Aylvan 4,721 ft., Viola 4,815 ft., dense 4,852 ft., dolomite 4,880 ft., sand 4,890 ft. and 4,897 ft., second Wilcox 4,926 ft.

Pottawatomie County: McMillan Petroleum et al 1 Arrington, SW NE NW 6-8n-4e, dry, TD 5,147 ft., Pawhuska 1,400 ft., Belle City 2,356 ft., Hogshooter 2,804 ft., lower Hogshooter 2,895 ft., Checkerboard 3,170 ft., Mayes 4,333 ft., Woodford 4,385 ft., Hunton 4,475 ft., Sylvan 4,698 ft., Viola 4,798 ft., Wilcox 4,991 ft., second Wilcox 5,081 ft.

Blackwell Oil & Gas Co. 1 Hartley, SE NW SE 34-10n-2e, dry, TD 6,018 ft., Sylvan 5,665 ft., Viola 5,756 ft., dense 5,825 ft., dolomite 5,855 ft., Wilcox 5,936 ft., second Wilcox 6,001 ft.

Stephens County: Davon Oil Co. 1 Ringer ranch, SE SE NW 32-1n-4w, dry, TD 6,508 ft., basal Pontotoc 2,648 ft., lime 3,113 ft., Deese 3,965 ft., Tussy lime 5,000 ft., Springer 5,440 ft., Simpson 6,356 ft., second Simpson 6,417 ft.

Washita County: Union Producing Co. 1

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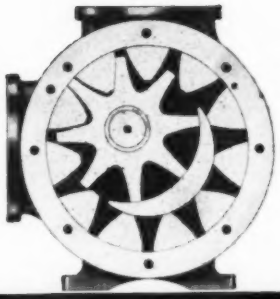

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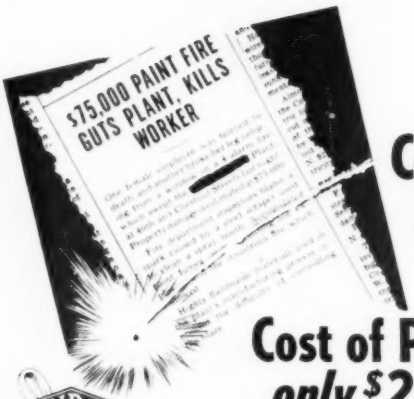

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MICHIGAN

Wildcat in Bay County Flows 95 Bbl. Per Day

MOUNT PLEASANT.—The second wildcat well in Section 29-17n-4e, Pinconning Township, Bay County, Don Rayburn 2 Cooper-Lucht, flowed at the rate of 95 bbl. of oil per day from the Traverse natural at 2,238 ft., total depth. No water was showing the first 48 hours, but after this test, well was reported to be cutting 10 per cent water and flow rate was pinched back to about 60 bbl. per day.

Michigan drilling activity was boosted during the week when 33 new drilling permits were approved by the Michigan Department of Conservation. Only six of the new permits were for wildcat tests. Largest development areas were the Stony Lake Traverse field, Oceana County, where seven new wells were approved, and the Reed City Stray sand gas reservoir where approval was granted to drill seven facility-service wells.

The total permits written to date this year was advanced to 668, compared to 555 approved drilling permits during the same period in 1948.

Completion of big Richfield flowing oil producers in the South Adams field, Arenac County, continued as Fred Raddell and Erwin Major's 1 Hanggi, SE SW SE 35-19n-4e, Adams Township, was acidized from 40 bbl. a day natural to 60 bbl. an hour at 4,290 ft., total depth. This was the fourth "hard-flowing" Richfield horizon producer to be drilled in the South Adams pool.

Another dry barrier to retard expansion of the Bard Dundee field, Gladwin County, was established this week as Basin Oil Co. 1 Kemp & See, NE NE NE 7-17n-2w, Beaverton Township, a semioutpost located 1½ miles south of the discovery well, was bottomed out dry in the Dundee at 4,014 ft. Top of objective was logged at 3,881 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Cheshire Township: Mercer Oil Co., Inc., 1 Horst, SE SE SE 4-1n-14w, Traverse 1,348 ft., dry; TD 1,373 ft.

Laketown Township: Dale M. Leonard 1 Klomparens, SE SE NE 14-4n-16w, Traverse 1,485 ft., dry; TD 1,505 ft.

Gladwin County, Beaverton Township: Sun Oil Co. 1 Ostic, NE SE NE 28-17n-2w, Dundee 3,846 ft., dry; TD 4,075 ft.

Kent County, Algoma Township: James J. McGerry, Trustee, 1 Rayburn, SE NE NE 7-9n-11w, Traverse 2,312 ft., dry, TD 2,355 ft.

Caledonia Township: Devine & Grimes 1 Ellis, NE NW NE 12-5n-10w, Traverse 1,986 ft., dry; TD 2,046 ft.

Livingston County, Conway Township: Leonard Oil, Inc., 1 Haas, NE NE NE 6-4n-3e, Berea 825 ft., dry; TD 845 ft.

Monroe County, Erie Township: Bastian Kruidenier, Trustee, 1 Potter et al, NE NW NW 22-8s-8e, Trenton 1,544 ft., dry, TD 1,830 ft.

Montcalm County, Evergreen Township: Mercer Oil Co., Inc., 1 Addis, SW NW SW 30-10n-6w, Dundee 3,178 ft., dry, TD 3,256 ft.

Muskegon County, White River Township: Turner Petroleum Corp. 1 Lehman, NE SW NE 3-12n-18w, Dundee 2,042 ft., dry, TD 2,054 ft.

Van Buren County, Geneva Township: W. D. Gannett 1 Banglots, NW NW NW 24-1s-16w, Traverse 1,104 ft., dry; TD 1,107 ft.

Pine Grove Township: Granville C. Berlin 1 Opas, NE NE NW 3-1s-13w, Traverse 1,357 ft., dry, TD 1,361 ft.

CALIFORNIA

Three Interesting Tests Prove Unsuccessful

LOS ANGELES.—Closely following Standard Oil Co.'s last unsuccessful test of their 4-2 S. F. & F. L. (after 717 days of continuous activity) three more important tests were reported nonproducing: Superior Oil Co. found their Blackwell's Corner venture, 4 O.L.C., 26-26s-19e, dry at total depth of 12,922 ft. The Humble Oil & Refining Co. 1 KCL 54-9 Paloma test failed to find production about a mile southwest of Paloma field in 9-32s-26e. The well bottomed at 11,467 ft. with the "double M" zone topped at 10,604 ft. General Petroleum's 1 Circle J at Newhall swabbed and flowed water from several intervals but showed no commercial oil. Total depth is 6,560 ft.

The South Cuyama extension, proved by Alphonzo E. Bell Corp. 45-6 Johnston, has brought Wilshire Oil Co. into the Cuyama Valley activity. Wilshire has announced intention to drill on a 80-acre section adjoining the Bell lease.

A semi-wildcat extending present Devil's Den production slightly southward was brought in by Honolulu Oil Corp. The extension is of the recently discovered shallow zone, Wagon Wheel formation. The corporation completed the discovery well 67 Alferitz, in May of this year. The new well topped the Wagon Wheel zone at 1,133 ft., Kreyenhagen at 2,040 ft., and Point of Rocks at 2,630 ft. The well bottomed at 3,255 ft. Production was obtained after plugging at 2,050 ft.

Two miles northwest of the new Honolulu well, Signal Oil & Gas Co. reported as dry its 4-1 Signal-Orcha'd, Section 4-25s-18e. Nothing encouraging was found to a total depth of 2,499 ft. In the same area, Signal Oil & Gas was unsuccessful at its other Devil's Den wildcat after reaching Cretaceous at 1,248 ft. This well, 36-1 Signal-Jack, 36-24s-17e, bottomed at 1,480 ft.

Standard Oil Co.'s 45 Van Sicklen in the Lost Hills area, 36-27s-21e, is cleaning out after squeezing at 13,665 ft. Present depth is 14,596 ft. In the Buttonwillow area, 5-28s-23e, the company's 27-6 KCL is drilling ahead beyond 13,544 ft. after setting 9⅝-in. casing to 5,780 ft.

Amerada Petroleum Corp. brought in a new gas well in Thornton gas field, Sacramento County. The well is shut in at 1,328 psi. after giving initial flow of 4,750,000 cu. ft. through ½-in. bean from perforations at 3,309-50 ft., total depth.

In South Mountain field, F. E. Fairfield 1 L.B. has stopped operations because of earth movement after the well had reached 650 ft. Six-inch casing had been set to 158 ft.

Union Oil Co. has dropped the last two of their Carrizo Plains tests, 4 and 5 Wreden. Good thicknesses of rather tight sands have been logged in all the Carrizo tests but all have been unproductive. Independent Exploration also had a disappointing Carrizo Plains test, their 67-36 Temblor-Rexroth, but have set location for another try.

CALIFORNIA WILDCAT FAILURES

Kern County, Carrizo Plains area: Independent Exploration Co. 67-36 Gene Reid-Independent Exploration-Temblor-Rexroth, 36-28s-19e, dry, TD 5,204 ft., elev. 2,614 ft.

Kettleman Hills South Dome area: Standard Oil Co. 4-2 S. F. & F. L., 12-25s-19e, dry, TD 12,954 ft., elev. 294 ft.

Paloma area: Humble Oil & Refining Co. 1 KCL 54-9, 9-32s-26e, dry, "L" 10,000 ft., "MM" 10,604 ft., TD 11,467 ft., elev. 290 ft.

Blackwell Corner area: The Superior Oil Co. 4 O.L.C., 26-26s-19e, dry, TD 12,922 ft., elev. 664 ft.

Edison area: Universal Consolidated Oil Co. 1 Mark Morris, 27-30s-29e, dry, Santa Margarita 3,652 ft., weathered schist 4,520 ft., hard schist 4,540 ft., TD 4,575 ft., elev. 339 ft.

Los Angeles County, Newhall area: General Petroleum Corp. 1 Circle J, 26-4n-16w, dry, TD 6,560 ft., elev. 1,300 ft.

Monterey County, Castroville area: The Texas Co. 1 Pieri, 19-23s-2e, TD 3,291 ft., elev. 4.21 ft.

San Benito County, Hollister area: Fairview Exploration Co. 1 Gregory, 9-12s-6e, dry, bottomed in shale, TD 1,281 ft., elev. 463 ft.

San Luis Obispo County, Carrizo Plains area: Union Oil Co. 4 Wreden, 33-28s-17e, dry, TD 5,113 ft., elev. 2,100 ft.

Union Oil Co. 5 Wreden, 5-29s-17e, dry, TD 6,655 ft., elev. 2,163 ft.

Santa Margarita area: Humble Oil & Refining Co. 1 Santa Margarita Land & Cattle Co., 36-32s-19e, dry, TD 2,500 ft., elev. 2,790 ft.

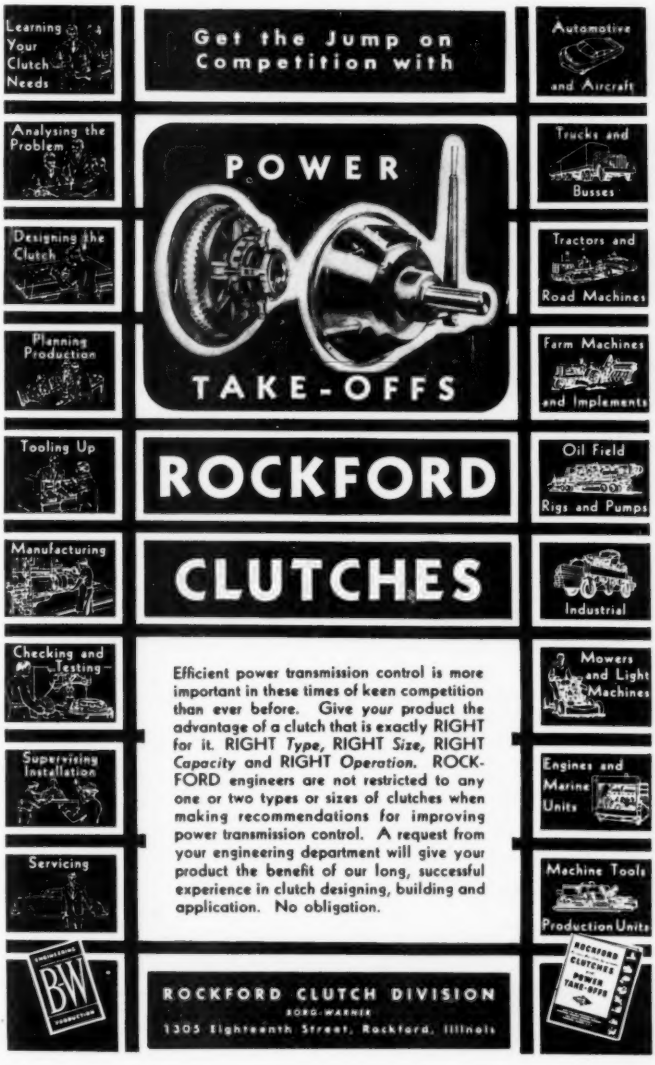
Humble Oil & Refining Co. B-1 Santa Margarita Land & Cattle Co., 9-32s-19e, dry, TD 1,401 ft., elev. 2,784 ft.

SOUTH LOUISIANA

Phillips Completes New Wildcat Out in Gulf

NEW ORLEANS.—A new oil discovery 2½ miles offshore from Cameron Parish, in the Gulf of Mexico, has been completed by Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc. The well gaged 934 bbl. of 42.3°-gravity oil per day through 14 64-in. choke, with 1,700 psi., pressure on the tubing. The hole was drilled to a total depth of 13,282 ft., and is producing from the Miocene section at 10,390-408 ft.

Stanolind Oil & Gas Co. has opened another new oil pool 7 miles offshore from Cameron Parish, with the completion of 1 State, Lease 1,137. The well flowed 447 bbl. of 34.9°-gravity oil daily through a ¼-in. bottom choke and 3/64-in. top choke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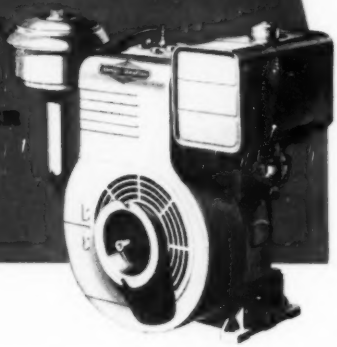

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with tubing pressure of 1,425 psi. Total depth of the well is 9,043 ft., and production is through perforations at 8,823-28 ft.

Atlantic Refining Co. has opened a new field with the completion of 1-A Sabine River Lumber Co., 24-5s-13w, Beauregard Parish. Through a 10/64-in. choke, the well flowed 230 bbl. of 39.6°-gravity oil per day through perforations at 9,304-23 ft., with 730 psi. tubing pressure.

Magnolia Petroleum Co. has abandoned 1 Eugene Island, Block 125, State Lease 693, St. Mary Parish, after drilling to a total depth of 12,233 ft., and taking three drill-stem tests with no shows.

In the new Lake Raccourci field of Lafourche Parish, Humble Oil & Refining Co. is encountering difficulty in completing 1 State Lease 1480, Lake Raccourci, confirmation test of the gas-condensate field. The well flowed mud and then salt water on test made at 14,003-08 ft., and then finally 400 bbl. of salt water daily with a slight show of oil. Hole is bottomed at 14,045 ft.

California Co. will make another try for oil off Grand Isle in an offshore lease where the company has already drilled a 13,968-ft. dry hole. The new deep-water wildcat is A-1 State Lease 822, directly south of Grand Ecaille and approximately 14 miles southeast from Grand Isle, in the West Delta area of Plaquemines Parish. Projected depth of the hole is 9,500 ft.

The 15 new locations for South Louisiana include 2 wildcat starts, both in Plaquemines Parish. There was 1 successful exploratory test completed in Cameron Parish, while 2 were dry, 1 each in Avoyelles and St. Mary Parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Cameron Parish: New oil discovery—Kerr-McGee Oil Industries, Inc., 1 State-Block 33, 2½ mi. offshore, in Gulf of Mexico, top sand 10,390 ft., TD 13,282 ft., perf. 10,390-10,488 ft., IP: 934 bbl. oil per day, 14/64-in. choke, GOR 460, TP 1,700 psi., 42.3°-gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Avoyelles Parish: Hunt Oil Co.-Berkshire Oil Co. 1 Ellis LeBorde, 33-3n-3e, dry; TD 8,898 ft.

St. Mary Parish: Magnolia Petroleum Co. 1 Eugene Island, Block 125, offshore, Gulf of Mexico, dry, TD 12,233 ft.

EASTERN TEXAS

Continental Test Looms as Possible Rodessa Discovery

DALLAS—Continental Oil Co.'s 1 Royall National Bank, Travis Peak wildcat ½ mile southeast of Tennessee Colony in Anderson County, was attracting attention as a possible Rodessa discovery, around 8,900 ft.

Cores from 8,915-65 ft. recovered 49 ft., being 25 ft. of finely crystalline lime and shale streaks and 24 ft. of porous light gray lime with gas bubbles on fresh core, with good odor on fresh breaks and with some oil stain. The bottom 3 ft. had salty taste. Coring time ran 3 to 5 minutes per foot.

A 22-minute drill-stem test of the Rodessa section, with packer at 8,935 ft., using ¼-in. top and bottom chokes and 2,700 ft. of water cushion, flowed the water cushion in 16 minutes, under maximum surface pressure of 100 psi., which continued to build up. Operators closed the tool, then for 1 hour and 40 minutes bled off the water cushion and gas, which had a light show of distillate. Maximum bleed pressure was 970 psi.

Recovery in the pipe was 30 ft. of distillate cut with water cushion, 390 ft. of 53°-gravity distillate, 330 ft. of heavily distillate-cut water cushion, and 410 ft. of gas and distillate-cut mud. Initial flowing bottom-hole pressure was 2,007 psi., increasing

to 2,342 psi., and to 4,715 psi. when shut in. At last report operators were conditioning hole to core ahead.

Location of the well is 560 ft. from northeast and 525 ft. from northwest lines of a 28-acre lease in the A. G. Monroe Survey, A-56. Original contract was to 10,250 ft., or the Travis Peak. Other majors are said to be supporting the venture.

Sample tops on the prospector were: Upper Glen Rose lime 7,150-60 ft., and top of the anhydrite 8,290-8,300 ft. Base of the Massive anhydrite, by log, was 8,735 ft. Elevation is 339 ft.

Placid Oil Co. 1 Ball Estate, Manuel Rionda Survey, A-58, Anderson County wildcat 2¾ miles southwest of Massey Lake, which was previously reported dry around 5,200 ft., was drilled ahead to total depth of 5,550 ft. A 14-ft. core from 5,200-14 ft. was 6 ft. of sandy shale and 8 ft. of shale, with no shows.

In Harrison County, Stanolind Oil & Gas Co. and Continental Oil Co. 1 Highland Lake Club, east outpost test to the Woodlawn field, J. C. Post Survey, A-583, was reported dry in the Travis Peak, and further tests were to be made in the Pettit limestone.

A 21-hour drill-stem test of the Travis Peak, from open hole at 6,799-6,835 ft., flowed gas estimated at 50,000 cu. ft. daily, but recovered 1,150 ft. of salt water and 150 ft. of drilling mud.

Another drill-stem test, apparently in the Pettit, from packer at 6,900 ft. to 7,000 ft., total depth, recovered 460 ft. of mud cut with gas and salt water, plus 440 ft. of drilling mud. Length of the test was cut to 21 minutes, due to mechanical trouble.

Angus G. Wynne 2 Newman, offset test in southeast Kaufman County, had total depth at 4,992 ft., in the Paluxy sand, and was waiting on pump. After perforating at 4,970-76 ft., with 36 shots, the well was washed with oil, then cleaned itself into pits, but was not gaged. It topped the Paluxy at 4,938 ft.

Humble Oil & Refining Co. prepared to pull casing from its 1-B J. W. Minton, Shadrich Morris Survey, 9 miles northeast of Hemphill in Sabine County, and abandon. Hole was cored most of the way from 8,040 ft., to total depth of 8,238 ft., recovering lime and shale with no shows. Ten-inch casing was cut at 5,800 ft.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) SUCCESSFUL WILDCAT

Wood County: Shell Oil Co. 1 Consumers Lignite Co., Friend McMahan Sur., 2 mi. S Alba, pumped 21 bbl. 17°-gravity oil a day, sub-Clarksville perforated 4,197-98 ft., TD 4,746 ft., PB 4,189 ft., elevation 450 ft.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Hill County: B. B. Banner 1 Sid Jones, A. C. Graves Sur., 1 mi. W Mount Calm, dry, TD 700 ft., Austin chalk 684-700 ft.

Hunt County: Garvin Oil Co. 1 J. W. Thrash, Lydia Ferguson Sur., 7½ mi. NE Greenville, dry, TD 3,150 ft., Woodbine section carried water, no top reported.

H. K. Kirk 1 Hunt County, Reuben Barker Sur., A-103, dry, TD 4,363 ft., Woodbine 2,605 ft., Buda 3,200 ft., Georgetown 3,375 ft., Paluxy 4,069 ft., by samples, no shows.

Red River County: W. W. Bradley 1 Cliff Adams, John Land Sur., 2½ mi. SE Fulbright, dry, TD 4,600 ft., Woodbine 1,065 ft., Paluxy 3,655 ft., Rodessa 3,705 ft., by samples.

Van Zandt County: E. B. Germany & Sons 1 Mrs. Pearl Skinner, A. Gray Sur., 4 mi. SE Grand Saline, dry, TD 6,805 ft., Woodbine 4,490 ft., Comanche lime 5,290 ft., Paluxy 6,492 ft., sub-Clarksville not defined, no shows.

Titus County: Morris Coats 1 Paul Pewitt, W. A. Dundas Sur., 15 mi. E Talco, dry, TD 4,735 ft., Blossom 2,370 ft., Eagleford 3,026 ft., Woodbine 3,443 ft., by samples, Paluxy 4,660 ft. by log.

LA.-ARK.

Barnsdall Test in Sarepta Field Coring in "D" Zone

SHREVEPORT—Barnsdall Oil Co. 1 Jessie Jackson, 22-22n-11w, in the Sarepta field of Bossier Parish, was coring ahead to the "D" zone of the Cotton Valley, and at last report was below 8,652 ft. with no shows. The well is said to be about 40 ft. low to Barnsdall's 1 Ardis, discovery of a new pay called the Ardis sand, located in 27-22n-11w. The well is slated to test the entire Cotton Valley formation.

C. H. Murphy 1 Crystal Oil & Refining Corp., approximately NW NW 14-21n-12w, Bossier Parish, was drilling in the upper Cretaceous at 4,840 ft. The new wildcat, scheduled to the Cotton Valley, or 9,000 ft., is 3 miles east of Rocky Mount.

Union Producing Co. 13 Unit, 13-17n-12w, Cotton Valley exploration in the Sligo field, was coring its way through the Travis Peak. Five cores from 6,751-6,938 ft. recovered sandy shale, with no shows. Last reported depth was 7,970 ft.

Interstate Natural Gas Co.'s 1 Tensas Delta, 11-9n-7e, tight operation in the Sicily Island field, Catahoula Parish, was reported to have made 20 side-wall cores and 2 conventional cores in the Wilcox, with no shows. At last report it was drilling in the upper Cretaceous at 6,577 ft.

Ohio Oil Co. and Gulf Refining Co. 1 O. L. Martin, 3-22n-7w, Claiborne Parish, logged top of the Travis Peak at 5,526 ft., on elevation of 350 ft., and was drilling ahead below 6,368 ft. Hayes B. Ownby Drilling Co. 1 J. P. Malone, 36-21n-6w, was

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shut down at 6,176 ft., in the Travis Peak, to run electrical surveys.

In Lincoln Parish, Southwest Gas Producing Co. 1 J. L. Liggin, 9-20-2w, was drilling below 8,110 ft., still in the Travis Peak.

Delta Drilling Co. 1 Crossett Lumber Co., 31-23n-6e, Morehouse Parish, was preparing to core at 6,130 ft. Operators were still calling the formation Cotton Valley. Sample top on that formation was 3,428 ft., on an elevation of 131 ft.

In Lafayette County, Arkansas, E. L. Pinkston 1 Knighton, 15-15s-23w, was drilling in the Smackover below 6,606 ft. Cores at 6,568-85 ft. recovered nonporous salty lime; at 6,590-6,604 ft. the recovery was slightly porous to tight oolitic lime with light gas odor.

Plains Production Co. 1 Stricklin, 33-14s-27w, Miller County, was drilling below 5,511 ft., in the Travis Peak. It has reported no shows.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Scotter Drilling Co. 1 Thigpen-Herold, NW NE NW 15-20n-13w, dry, TD 2,730 ft.

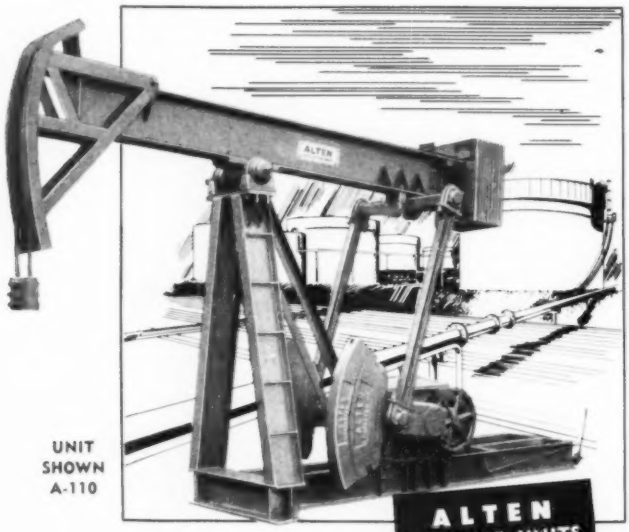
LaSalle Parish: Hunt Oil Co. 14 Louisiana Delta, NE NW 25-5n-4e, dry, TD 7,000 ft.

ARKANSAS WILDCAT FAILURES

Bradley County: A. J. Slagter 1 A. Hayward, NW NW NE 2-16s-9w, dry, TD 4,710 ft., Eagle Mills 4,705 ft., elevation 89 ft.

Ouachita County: C. G. Davis 1 M. E. Peace, SW SW SE 8-15s-17w, dry, TD 4,035 ft., James 2,704 ft., Sligo 2,882 ft., Hogg sand 2,892-2,958 ft., elevation 182 ft.

Union County: V. P. Grage 1 Southern Co., 8-16s-14w, dry, TD 5,187 ft., Buckner 5,096 ft., oolitic lime 5,130 ft., elevation 88 ft.



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ILLINOIS

Richland County Wildcat Indicates New Production

MATTOON.—Discovery of another new producing area in Richland County appears to have been made by Bell Brothers in their 1 Porter-Seiler Community, NW NE SE 3-4n-10e. In a drill-stem test of O'Hara lime at 2,986--91 ft. with bottom of the hole at 2,996 ft., the well showed gas in 7 minutes and recovered 1,900 ft. of clean oil. Casing has been run to the top of the interval. The area is about 6 miles north of Olney and about 1½ miles southwest of nearest production in the East Dundas pool.

Another new pool also is in prospect in Franklin County where Carter Oil Co. 1 Trustees Tract 8, SW NW NE 12-7s-4e, 1½ miles northeast of Thompsonville and a mile northeast of the North Thompsonville pool, showed gas in 2 minutes and started flowing clean oil in 17 minutes in a drill-stem test at 3,144-54 ft. in the Aux Vases. A string of 7-in. casing has been cemented on the pay.

National Associated Petroleum Co. and Continental Oil Co. 1 Cockcroft, NW NW SW 1-12n-11w, new pool opener in southeastern Edgar County, is being tested on the pump following swabbing tests in which it made as much as 130 bbl. in one 12-hour period. Before being put on the pump, it was reacidized with 3,000 gal., and after cleaning it made 35 bbl. of oil and 10 bbl. of water in the first hour. Previously, it had been treated with 2,250 gal. of acid. Producing horizon is the McClosky lime.

Confirmation of production in the new area recently opened 1½ miles east of the North Junction pool in Gallatin County has been given by completion of Oil Management Co. and Hayes Drilling Co. 1 Walter Drone, NW NW NE 2-9s-9e, 10-acre east offset to the discovery well. Placed on the pump after a 35-qt. shot, the well is making about 75 bbl. per day with production from Pennsylvanian sand at 1,600-12 ft. The discovery well, 1 Wilson, drilled by the same operators, was completed late in August. In the meantime, the same operators have quit their 2 Drone, located 10 acres further east, after drilling to 1,788 ft.

ILLINOIS SUCCESSFUL WILDCAT

Wabash County: Hayes Drilling Co. 1 Schafer, SE NW NE 15-1n-12w, IP 76 bbl., Biehl sand 1,470-87 ft., TD 1,495 ft. (Extension Allendale pool).

ILLINOIS WILDCAT FAILURES

Clark County: National Associated Petroleum Co. 1 Morgan, NW NW NW 4-11n-11w, dry, TD 2,400 ft.

Edgar County: C. E. Skiles 1 Harnham, NW NW NE 18-13n-10w, dry, TD 2,063 ft.

Franklin County: National Associated Petroleum Co. 1 Norris, SE NE SE 28-6s-1e, dry, TD 2,945 ft.

Lawrence County: Big 4 Oil & Gas Co. and Hayes Drilling Co. 1 Burgett, SW SE NW 15-3n-13w, dry, TD 2,501 ft.

Madison County: J. M. Pierce 1 Neismann, NW NE NE 11-5n-7w, dry, TD 800 ft.

Joe Kesl, Jr., 1 Wolf, NW NW SE 31-6n-6w, dry, TD 850 ft.

Washington County: Gulf Refining Co. 1 Grathwohl, SW SW SE 34-1n-1w, dry, TD 4,334 ft.

Wayne County: Russell P. Johnson 1 Smith & Byers, SE SW SE 14-3s-5e, dry, TD 3,404 ft.

W. O. Lucas 1-A Le Trimmer, NE SW NE 4-1n-9e, dry, TD 3,270 ft.

Winmar Oil Co. 1 Greenwalt, SE NE SW 14-1s-5e, dry, TD 3,200 ft.

White County: W. C. McBride, Inc., 1 Rosselot, SE SE NE 31-4s-9e, dry, TD 3,445 ft.

Ralph Halbert 1 C. D. Hubele, SE NE SE 12-6s-10e, dry, TD 1,426 ft.

Taylor-Schumacher 1 Winter, NW NW NE 36-4s-9e, dry, TD 3,284 ft.

ROCKY MOUNTAIN

World's Deepest Test Is Abandoned by Superior

DENVER. — Superior Oil Co. has abandoned its 1 Unit, SW NE SW 27-27n-103w, the world's deepest well, located on Pacific Creek Unit, Sublette County, Wyoming. The well was drilled to 20,521 ft., total depth, and topped the Frontier (Cretaceous) formation at 19,720 ft. More than 2 months of testing various zones in the Frontier and Mesa Verde was done by Superior prior to abandoning, but only small volumes of gas were recovered on the tests. Casing was pulled on the well and the large National 160 rig has been stacked at the company's Casper warehouse. Good drilling time was logged by Superior on the well, in spite of several fishing jobs, which were cleaned up without loss of much time. Seven-inch casing was cemented at 19,765 ft. before drilling to the 20,521-ft. depth.

Atlantic Refining Co.'s discovery at Lightning Creek, Niobrara County, Wyoming, will apparently not be as large a producer as originally expected from cores of the Basal Sundance sand. The well is 1 State 36, NE NW NW 36-35n-66w, 10 miles southwest of the Lance Creek field. Top of Basal Sundance was logged at 3,872 ft. and on drill-stem test of the top 10 ft. the well made 700 ft. of 41.7°-gravity oil in 35 minutes. The well was drilled to 3,991 ft. in the Red Beds and casing run to total depth. Through casing perforations the well made water in the lower zone, which was squeezed. Through perforations between 3,895-3,920 ft. the well still made approximately 50 per cent water, swabbing 4½ bbl. of oil per hour. This zone was then squeezed and casing perforated between 3,870-90 ft. in the top of the sand. The operator swabbed 6 bbl. of oil per hour from this zone, with gas increasing and the well flowing by heads on occasion. The operator will continue to test the well from this zone.

Equity Oil Co. has plugged and abandoned its 1 Unit, CNW SW 33-21s-21e, on the Thompson Unit, Grand County, Utah, at 13,767 ft., total depth, the deepest well to be drilled in the state. It is believed that the well was in Mississippian at total depth, although the operator has not released tops on the wildcat. The well was started by Equity and Pacific Western Oil Co. but Pacific Western withdrew from the operation just below 12,000 ft. The wildcat was located on a seismic prospect jointly shot by the two operators.

Stephens Petroleum Co. of Oklahoma City had reported light oil saturation in three zones in the top of Mississippian at 1 Allotted, SE SE SW 9-29n-8w, on the Blacktail structure, Pondera County, Montana. Saturated cores were recovered between 5,255-62, 5,275-84, and 5,289-92 ft., with the best show in the lower zone. The operator is coring below 5,300 ft. but is expected to run casing and test these shows prior to completion. The Blacktail structure is east of the thrust fault zone, where considerable geological work has been done in the past 2 years, and Stephens has a 10,000-acre block covering the structure.

WYOMING WILDCAT FAILURES

Lightning Flat, Crook County: Amerada Petroleum Corp. 1 Robert Ormesher, CNW NW 35-58n-68w, 3,450 ft. TD, plugged and abandoned; Newcastle 3,390 ft. El. 4,048 ft. RT.

Stroner area: Trigood Oil Co. 1 Wood, SE NW SW 21-55n-68w, 5,490 ft. TD, plugged and abandoned, Niobrara 2,885 ft., Newcastle 4,558 ft., Dakota Silt 4,743 ft., Dakota Sand 4,804 ft., Fuson 4,928 ft., Lakota 4,995 ft., Morrison 5,039 ft., Sundance 5,135 ft., Middle Sundance Sand 5,313 ft.

North Sage Creek, Fremont County: M. E. Morton 2 Tribal "B," CE½ NE SW 4-1n-1w (WRM), 2,450 ft. TD, PB 2,395 ft., plugged and abandoned, Nugget 527 ft., Chugwater 775 ft., Alcova 1,055 ft., Dinwoody 2,037 ft., Phosphoria 2,121 ft., Tensleep 2,429 ft.

Smith Cut, Johnson County: Amerada Petroleum Corp. 1 Unit, CSE SE 10-44n-79w, 13,254 ft. TD, plugged and abandoned, Lewis Shale 5,786 ft., Niobrara 11,234 ft., first Wall Creek 11,870 ft., Mowry 12,607 ft., Dakota 13,088 ft., Fuson 13,169 ft.

Nitchie Gulch, Sweetwater County: Amerada Petroleum Corp. 1 Unit, CSE SE 17-23n-103w, 8,705 ft., plugged and abandoned, Blair 2,805 ft., Baxter 3,656 ft., Frontier 7,760 ft., Aspen 8,010 ft., Dakota 8,432 ft., Morrison 8,620 ft.

COLORADO WILDCAT FAILURES

Hugo area, Lincoln County: Milo Siegel-Frontier et al 1 Plains Exploration. Center Lot 5-3-11s-52w, 3,677 TD, plugged and abandoned, Niobrara 2,440 ft., Fort Hays 2,850 ft., Codell 3,032 ft., Greenhorn 3,112 ft., Dakota 3,387 ft., Fuson 3,618 ft.

Hartzel, Park County: McDannald Oil 1 Government, SW SE SE 1-12s-75w, 7,098 ft. TD, plugged and abandoned in Niobrara Shale, Frontier 4,375-4,400, Dakota 4,799 ft., repeated Dakota 5,600 ft.

MONTANA WILDCAT FAILURE

West Ragged Point, Musselshell County: The Texas Co. 2 NPRR "A," NE SE SE 3-11n-29e, 4,774 ft. TD, plugged and abandoned, Colorado 443 ft., Mosby 1,145 ft., first Cat Creek 2,110 ft., Kootenai 2,210 ft., second Cat Creek 2,215 ft., third Cat Creek 2,470 ft., Morrison 2,560 ft., Ellis 2,745 ft., Gypsum Springs 3,090 ft., Amsden 3,213 ft., Heath 3,650 ft., Otter 4,282 ft., Kibbey 4,683 ft.

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PERMIAN BASIN

NW Runnels County Gets New Pennsylvania Strike

MIDLAND—Fred M. Manning, Inc., completed its 1 S. L. McNay, in northwestern Runnels County, as a small Pennsylvanian discovery. On an elevation of 2,042 ft., it entered the Strawn at 4,598 ft., and had top of pay at 5,284 ft. Initial potential, on the pump, was 55.4 bbl. of 42 -gravity oil a day from perforations at 5,282-90 ft. Location is 4 miles northeast of Humble Oil & Refining Co. 1 Sally Odom, 310-bbl. per day Strawn discovery at 5,435 ft. The 1 Odom had top of the Strawn at —2,721 ft., compared with —2,556 ft. in the McNay.

A Gardner sand discovery was in the making at S. C. Herring Drilling Co. 1 Aldredge, Section 521, Moseley Survey, 10 miles northeast of Winters. After drilling plug at 3,985 ft., the well flowed 6 bbl. of oil an hour until storage was filled.

Pecos County.—Ten miles south of Grandfalls, Fullerton Oil Co. 1-D Kone, 36-3-H&TC, recovered 42 -gravity oil from top of the Ellenburger, on a drill-stem test at 7,969-83 ft. When the tool was opened, gas showed in 37 minutes, and after 1½ hours, recovery was 5,723 ft. of oil, 330 ft. of black water in bottom of the pipe, plus 1,000-ft. water blanket. Operators ran electrical surveys and prepared to set casing to 7,696 ft. for production tests on the above section. On an elevation of 2,450 ft., the Ellenburger was entered at 7,968 ft. The well was said to have shown some signs of production in the lower Permian at 5,198-5,685 ft. The 1-D Kone is located in shallow Pecos Valley field, 4 miles east of Santa Rosa gas-distillate field.

Midland County.—Magnolia Petroleum Co. 2-30 Glass, 30-40-T&P, east offset to Pegasus field opener, recovered 60 ft. of 44.9 -gravity oil, with gas estimated at 219,000 cu. ft. daily, on a 3½-hour drill-stem test of the Devonian at 11,838-11,915 ft.

An east offset to the discovery of South Midland field has been staked by Ted Weiner, as the 1 L. B. Floyd, SW NW 15-37-T3S-T&P.

Andrews County.—George P. Livermore, Inc., and Deep Rock Oil Corp. 1 Mayhew, NW SW 20-A51-PSL, 5 miles north of Dollarhide field, was drilling ahead at 11,330 ft. It is believed to be in the Montoya, upper Ordovician, but official reports were not available.

Additional Clear Fork production was added to the north end of Dollarhide field at Cities Service Oil Co. 1-F Cowden, 14-A52-PSL, which completed from the Clear Fork and the Devonian, as did the discovery. This second producer, an east offset to the discovery, flowed 1,132 bbl. of 38 -gravity oil, after acid, from the Clear Fork at 6,540-6,670 ft. Gas-oil ratio was 746 cu. ft. From the Devonian, the well gaged 430 bbl. of 40 -gravity oil through 27 64-in. choke, from pay at 7,842-7,917 ft. Gas-oil ratio was 487 cu. ft.

Scurry County.—Standard Oil Co. of Texas 5-2 Brown, NE NW 440-97-H&TC, Ellenburger test on the north side of North Snyder field, recovered 180 ft. of sulfur water, with no shows of oil or gas, on a 1½-hour drill-stem test at 8,094-8,144 ft. Electrical surveys were to be run. Last week the well found some shows of oil and gas in the top of the Ellenburger. If unproductive, it probably will be plugged back to around 6,900 ft. for completion from the regular pay.

According to field sources, Placid Oil Co. was ready to enter the reef exploration, west of the town of Snyder. It was indicated that one or more wells might be drilled on the southwest 83 acres of Section 251, the east half of northeast quarter of Section 295, the northeast quarter of the southeast quarter of Section 293, or the west half of the west 280 acres of Section 252, all in Block 97, H&TC Survey.

Reagan County.—Extension of Pennsylvanian Bend oil production on the southeast end of Benedum gas-distillate field was in prospect at two wells. One-half mile south of present production, Plymouth Oil Co. 2-50 Elliott, 50-Y-TC Survey, recovered 1,100 ft. of oil and 950 ft. of oil and gas-cut mud on a 2-hour drill-stem test from 10,650-715 ft. Gas came to the surface in 6 minutes. Testing was to continue.

Plymouth 2-45 Johnson, 45-Y-MK&T, ½-mile east extension prospect, attempted a drill-stem test at 10,664-722 ft., but had mechanical trouble in 12 minutes. Water blanket came to the surface in 6 minutes and recovery was 360 ft. of 47 -gravity oil.

Texas Panhandle.—In Ochiltree County, Gulf Oil Corp. 1-A R. E. Wample, J. J. Balintine Survey, 21 miles southwest of Perryton, was drilling below 10,241 ft. in lime. A drill-stem test from 9,938-10,045 ft., open 7 hours, produced a light blow and recovered 880 ft. of salt water, with no shows.

Sinclair Oil & Gas Co. 2-B C. S. Lips, 157-13-T&NO, northwest outpost to Lipps field of Roberts County, ran a 2-hour drill-stem test from 9,050-9,137 ft. It produced a steady blow throughout, and recovered 180 ft. of drilling mud, plus 2,500 ft. of salt water. Total depth was 9,137 ft. Operators prepared to run 7-in. casing and test a gas show at 8,120-91 ft.

Toklan Production Co. 19-A J. M. Sanford, 78-46-H&TC, Hutchinson County, had an estimated 1,000,000 cu. ft. of gas daily at 2,315-50 ft., which increased to an estimated 10,000,000 cu. ft. daily at 2,375-2,545 ft. After treating with 7,500 gal. of acid, it swabbed 2½ bbl. of oil a day, and at last report was swabbing at the rate of 4 bbl. of oil and 4 bbl. of water in 8 hours.

WEST TEXAS (DISTRICTS 8 AND 7-C)
SUCCESSFUL WILDCAT

Runnels County: Fred M. Manning, Inc., 1 S. L. McNay, Sec. 293, J. Jeffries Sur., 3½ mi. NW Wingate, 4 mi. NE Humble Oil & Refining Co. 1 Odom, pumped 55.4 bbl. 42 -gravity oil a day, plus some salt water, GOR 740 cu. ft., perforated 5,282-90 ft. and acidized, top pay 5,284 ft., TD 5,626 ft., elevation 2,042 ft., top Strawn 4,598 ft., Ellenburger 5,470 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C)
WILDCAT FAILURES

Coke County: Rice Bros., Inc., 1 W. R. & George M. Stephenson Unit 1, W. R. Stephenson Tract, Emil Hank Sur. 383, 2 mi. S Bronte, 3½ mi. SE Bronte field, dry, TD 5,406 ft., Palo Pinto 4,265 ft., Strawn 5,058 ft., Ellenburger 5,348 ft.

Crockett County: Gar-Ter Drilling Corp. 1 Sinclair-Andrews Estate, Sec. 61, Blk. UV, GC&SF Sur., 20 mi. NW Ozona, dry, TD 2,225 ft.

Lynn County: Barnsdall Oil Co. 1 Billie Williams, NW NW 2-8-EL&RR, 4½ mi. SW Tahoka, dry, TD 10,556 ft., San Andres 3,730 ft., Wichita Albany 6,260 ft., Sprayberry 6,490 ft., shale 8,400 ft., Reef 9,085 ft., Mississippian 9,880 ft., Ellenburger 10,340 ft., elevation 3,045 ft., no shows.

Pecos County: Hunt Oil Co. 4 Elsinore Royalty Co., 18-C-GC&SF, dry, TD 1,395 ft.

Permian Drilling Co. 1 Dow Puckett, SW SE 107-3-T&P, 12 mi. SW Fort Stockton, dry, TD 3,504 ft., swabbed 1½ bbl. oil in 24 hr., Tansill zone, 2,485-2,600 ft.

Sterling County: C. C. Daniel and C. M. Kenley 1 Lester Foster, 27-11-SPRR, 8 mi. SE Sterling City, dry, TD 1,364 ft.

Tom Green County: Shackelford Drilling Co. 1 E. C. Rawlings, 85-5-H&TC, 5 mi. NW Water Valley, dry, TD 1,500 ft.

TEXAS PANHANDLE (DISTRICT 10)

Ochiltree County: J. M. Huber Corp. 1 F. Pazoureck, SW SE 16-JT-TWNG Sur., 11 mi. SW Perrytown, dry, TD 6,025 ft., elevation 3,010 ft., no shows.

SOUTHEASTERN NEW MEXICO

HOBBS—Apache Oil Co. 1 Noble Trust, NE NE SW 18-4s-27e, Chaves County, had

total depth at 6,392 ft., in hard gray limestone, and was preparing to run casing. According to field sources, top of the Pennsylvanian was 5,030 ft., and top of the Mississippian was 6,350 ft. Elevation is 3,872 ft.

A drill-stem test at 6,205-6,300 ft., in the Pennsylvanian, open 2 hours, had gas in 3 minutes, estimated at 4,000,000-5,000,000 cu. ft. daily; recovery was 30 ft. of distillate plus 30 ft. of distillate and mud. Flowing pressure was 735 psi. Shut-in pressure in 15 minutes was 2,300 psi. A 2-hour test from 6,299-6,347 ft. recovered 90 ft. of drilling mud, with no shows. Flowing pressure was 60 psi., and shut-in pressure was 125 psi.

El Paso Natural Gas Co. has purchased the gas rights on 14,000 acres of leases surrounding the discovery, and was planning to drill a second test. Location is 6 miles west of the town of Olive.

Amerada Petroleum Corp. 1-BTB, 26-12s-33e, had total depth at 11,199 ft., set $5^1/_2$-in. casing to 10,270 ft., and drilled out to 10,202 ft. After acidizing with 250 gal., the well flowed 1,250 bbl. of 57 -gravity oil in $21^1/_2$ hours, through $^1/_2$-in. choke. Gas-oil ratio was 480 cu. ft. At the end of that time it started making some 15 per cent water, and flowed 1,084 bbl. of oil and 190 bbl. of salt water in 24 hours.

Operators set retainer at 10,165 ft., and squeezed perforations at 10,170-180 ft., then shot again at 10,155-165 ft. After acid treatment the well flowed 632 bbl. of oil, with no water, in 15 hours and 40 minutes, through $^1/_4$-in. choke. Gas-oil ratio was down to 271 cu. ft.

SOUTHEAST NEW MEXICO WILDCAT DISCOVERY

Eddy County: Magnolia Petroleum Co. 1 Yates Federal, NE SE 31-9s-36e, pumped $2^1/_2$ bbl. oil, 120 bbl. salt water in 24 hr., perforated 4,630-45 ft., TD 4,952 ft., PB 4,865 ft.

TEXAS GULF COAST

Gas-Sand Pay in Gillock Field Extended to South

HOUSTON.—John W. Mecom has extended the big gas-sand pay in the Gillock field, Galveston County, 1,350 ft. in a southerly direction. The extension well, B-1 Maco Stewart, gaged 301 bbl. of 35 -gravity oil per day through perforations at 8,766-78 ft., with tubing pressure of 475 psi. and casing pressure 825 psi.

H. C. Cockburn has confirmed oil production in the Prasifka field, Wharton County, with completion of 1 Havlinka Unit 2. The well flowed 181 bbl. of 29.9 -gravity oil daily through $^1/_8$-in. choke through perforations at 5,515-25 ft., with 665 psi. pressure on the tubing.

New gas and condensate production is being opened in the Palacios area of Matagorda County at J. R. Meeker et al 1 Margerum et al, Lewis Goodwin Survey, Abstract 162. The well flowed an unestimated amount of distillate and gas from 9,150-9,218 ft. Shut-in pressure on tubing was 6,625 psi.

The first discovery for Grimes County has been completed at the E. G. Goforth 1 E. G. Goforth fee, in William Berryman Survey, 1 mile southeast of Todd. On drill-stem test made from perforations at 7,604-11 ft., the well flowed an estimated 1,000 M c.f. of gas per day and a large amount of distillate through $^1/_4$-in. chokes, and developed 545 psi. working pressure.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Galveston County: New pay, at Gillock—John W. Mecom B-1 Maco Stewart, in W. K. Wilson League, top sand 8,712 ft.; TD 8,794 ft., perf. 8,766-88 ft., IP: 300 bbl. oil per day, GOR 377, TP 475 psi., CP 825 psi., 37.0 gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: J. S. Abercrombie & Magnolia Petroleum Co. 1 J. D. Kuhn Estate, at Old Ocean area, in John Cummings League, dry; TD 11,250 ft.

Gulf Oil Corp. 2 S. S. Perry et al, in S. F. Austin League, A-20, at Peach Point field, dry; TD 11,830 ft.

Jasper County: J. C. Means, Jr., 1 A. J. Davis, in E. Morris Sur., A-28, dry, TD 7,807 ft.

Matagorda County: Nelson Bunker Hunt 1 Braman Estate, in Ira Ingram Sur., A-49, $2^1/_2$ mi. NE of Matagorda townsite, dry, TD 6,676 ft.

OHIO, KENTUCKY

Second Producer Assured Northeast of Hazlett Test

COLUMBUS.—The National Gas & Oil Co. moved $^1/_2$ mile northeast of the 1 Hazlett for a second producer south of Roseville. On 1 Combs-Goodlive, Section 9, Harrison Township, Perry County, the Clinton, logged at 3,407-3,507 ft., filled 300 ft., while drilling in and flowed and swabbed 100 bbl. in 24 hours after shot.

L. L. Dittoe et al 1 Dora Swinehart, Section 27, Hopewill Township, Perry County, filled 900 ft. in 12 hours natural and flowed 135 bbl. in 24 hours after a 70-qt. shot. The producer extends the Baker pool a location to the northwest. In the same township, Dave Shafer has started drilling on a wildcat test on F. H. Coble in Section 11.

Wiser Oil Co. completed a small well on Brown-Engleman, Section 14, Bethlehem Township, Stark County. White Clinton at 4,467-90 ft. gaged 350,000 cu. ft. of gas natural and 500,000 cu. ft. when shut in after shot. Rock pressure was 1,250 lb. in 48 hours. Two and one-half miles to the northwest, Burtner, Morgan & Stephens have started a wildcat on A. & E. Eberly in Section 9. Another wildcat test in the township, Ed Obermiller 1 F. D. Thompson, Section 21, looks like a dry hole. Red sand at 4,313-47 ft. showed 28,000 cu. ft. of gas, with the White Clinton at 4,347-66 ft. showing broken and dry.

WESTERN KENTUCKY

OWESBORO.—Further substantiation of the importance of the recently opened West Glenville pool in 17-N-2E, Daviess County, was given the past week by the completion of another good well at J. C. Miller Oil Co. 1 Johnson. The best producer yet completed in the area, the well swabbed and flowed initially at the rate of 600 bbl. of clean oil per day. Producing horizon is the McClosky lime at 1,903-13 ft., the same pay in which the three previous wells have been completed. Before tested, the well was given a 4,000-gal. acid treatment. The area was opened early in August by Wasson Oil Co. with a 115-bbl. pumper in the pay at 1,891-94$^1/_2$ ft. Currently, there are 5 active operations in the area.

The Waitman pool in Daviess County has a prospective new producing horizon at D. G. & S. Oil Co. and J. C. Ellis 3 R. P. Willett, NW NW SW 9-Q-31, which is preparing to test a Tar Springs sand at 798-801 ft., in which favorable showings were encountered. Other production in the pool is from Cypress sand and McClosky lime.

Extension of the South Morganfield pool $^1/_4$ mile southwestward is indicated at Sun Oil Co. 2 Reisinger, 3-N-19, which has substantial oil showings in the pool's McClosky lime pay zone at 2,592-2,607 ft. No drill-stem tests were made, but $5^1/_2$-in. casing has been run to 2,575 ft. preparatory to production tests. Bottom of the hole is 2,609 ft.

EASTERN KENTUCKY

ASHLAND.—In Bath County, 25-T-71, and about 1 mile east of the town of Olympia, R. B. Tamlyn et al 1 Pipenbrink is drilling at 310 ft. and looking for top of upper Ordovician pay. The well is an attempt to extend old Olympia pool production.

In western Lewis County, 4-Y-72, H. P. Purnell et al are drilling ahead at 970 ft. and not yet in the Tyrone series. It is a rank wildcat designed to test part of the upper Knox formations.

Another combination oil and gas well is apparent for Big Sandy gas field: F. P. Hurt 1 R. E. Blackburn, on Brushy Branch of Wolf Creek, is making an undetermined amount of oil plus 3,000,000 cu. ft. of gas daily from the Big lime, and is now being equipped for pumping.

EASTERN KENTUCKY WILDCAT FAILURE

Menifee County: George McNabb 1 Henry C. Smallwood, Black Stand Creek of Indian Creek, dry, TD 1,112 ft., Devonian black shale 892 ft., Corniferous lime 1,068 ft., water.

INDIANA

EVANSVILLE.—Opening of a new producing area 6 miles northwest of Evansville and 2 miles southeast of the Armstrong townsite has been established with the completion by Ryan & Sharp of their 1 George Schweikart, NE NE NW 15-5s-11w, pumping 150 bbl. of clean oil per day from O'Hara lime at 2,536-42 ft. Nearest production is in the Darmstadt pool, about 2 miles to the northeast. Prior to being placed on the pump, the well flowed by heads after a 2,000-gal. acid treatment of the pay zone.

Evans & Dobbs Drilling Co. and Sam Lewis & Sons 1 A. C. Brown, NE NW NE 28-2s-11w, which opens another new area about 2 miles east of the North Owensville pool in Gibson County, also has been completed, making 100 bbl. daily on the pump from Benoist sand at 2,112-34 ft. Bottom of the hole is 2,150 ft. The area is about 3 miles northeast of the Owensville townsite.

Wabash Petroleum Corp. 1 Houghlan, NE NW NE 31-1n-9w, Union-Bowman field, Pike County, continues to show as one of the best wells ever completed in the state. As previously reported, the well came in flowing at the rate of 60 bbl. per hour and had to be shut in for additional tankage. Reopened since then, it flowed 67 bbl. in $2^1/_2$ hours, and then made 410 bbl. in 17 hours. Production is from Rosiclare lime at 1,655-61 ft. with bottom of the hole at 1,667 ft.

Pumping equipment is being installed at William P. Muller 1-A Simpson, SW NW SW 14-1n-10w, prospective new pool opener in the area about a mile north of the Hazelton pool, in Knox County.

INDIANA SUCCESSFUL WILDCATS

Gibson County: Evans & Dobbs Drilling Co. and Sam Lewis & Sons 1 A. C. Brown, 28-2s-11w, IP 100 bbl., Benoist 2,112-34 ft., TD 2,134 ft. (New pool).

Vanderburgh County: Ryan & Sharp 1 George Schweikart, NE NE NW 15-5s-11w, IP 151 bbl., O'Hara 2,536-42 ft., TD 2,650 ft. (New pool).

INDIANA WILDCAT FAILURES

Gibson County: Vic Gallagher 1 Phillips-Shoemaker, NW NW NW 21-3s-13w, dry, TD 3,010 ft.

Greene County: A. J. Slagter, Jr., 1 McKee, SE NE NW 16-6n-6w, dry, TD 1,843 ft.

Knox County: Spear Oil Co. 1 Prentice Martin, SW SE SW 11-1n-8w, dry, TD 1,361 ft.

A. J. Slagter 1 Bland, NE NE SW 9-5n-10w, dry, TD 2,895 ft.

Vanderburgh County: Illind Oil Co. 1 Seiffert Community, NW SW SE 33-6s-11w, dry, TD 1,780 ft.

Vigo County: Gilliam Drilling Co. 1 Swadener, SE NW NW 35-10n-8w, dry, TD 2,113 ft.

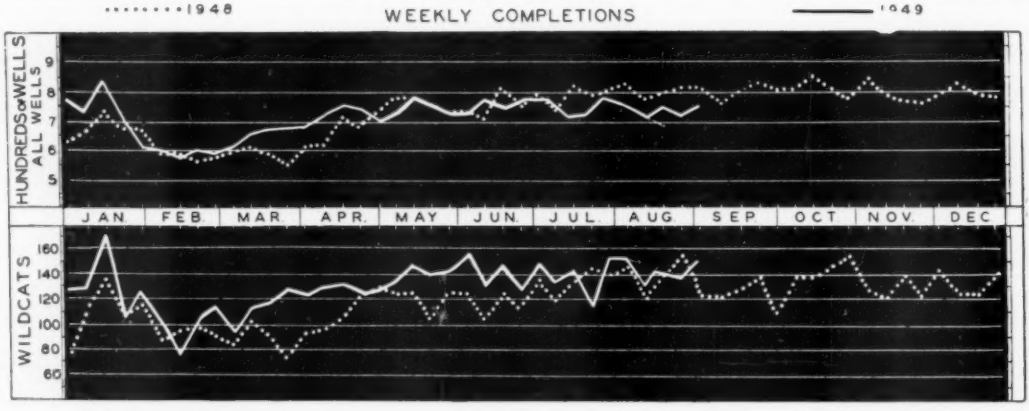
John M. Sheppard 1 C. E. Jennings, SE NE NE 4-11n-9w, dry, TD 1,798 ft.

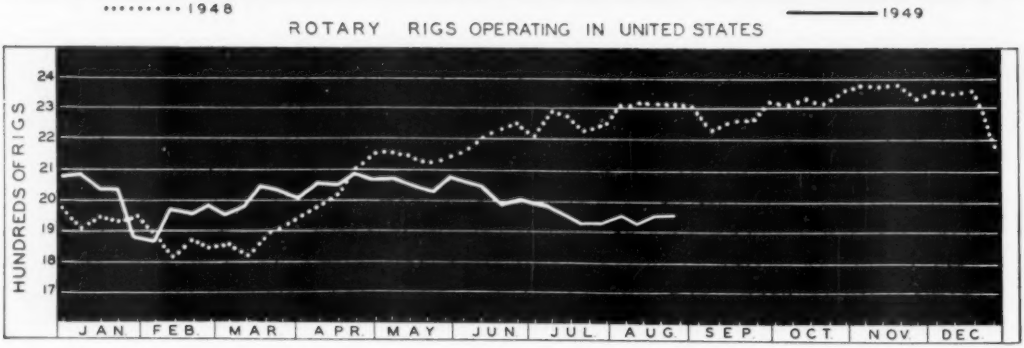
Warrick County: Wallace Wright et al 1 Kenneth Heim, NW NW SW 32-5s-9w, dry, TD 2,140 ft.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 3, 1949

	Total of all wells					35 wk.		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	4	0	*5	10,902	666	1,007	0	0	0	0	0	0	0	0	0	0
Pennsylvania	17	4	4	†9	32,077	985	1,717	0	0	0	0	0	0	0	4	1	5
West Virginia	6	0	6	0	26,029	320	537	0	0	3	0	3	1	0	10	7	18
Ohio	24	7	8	†9	56,675	708	897	0	0	0	0	0	1	0	2	24	27
Indiana	35	13	0	22	63,038	868	691	2	0	0	8	10	25	0	1	161	187
Kentucky	28	7	6	15	48,393	601	456	0	0	0	1	1	18	0	0	48	66
Illinois	66	32	0	34	167,345	1,688	1,548	1	0	0	13	14	42	0	1	289	332
Michigan	30	13	1	§16	69,784	654	532	0	0	0	11	11	20	0	1	200	221
Kansas	74	33	10	†31	245,455	2,124	2,016	3	0	0	10	13	49	0	5	267	321
Neb., Mo., Iowa	0	0	0	0	0	16	5	0	0	0	0	0	1	0	0	11	12
Oklahoma	90	51	4	†35	325,774	2,861	2,703	2	0	0	15	17	99	11	10	426	546
Texas	214	139	7	68	920,652	8,836	7,741	5	1	1	39	46	278	35	82	1,523	1,918
North Central (Dist. 7-B & 9)	95	54	2	†39	255,298	2,978	2,432	2	0	0	17	19	129	0	11	600	740
West (Dist. 7-C & 8)	50	43	0	7	307,303	2,113	2,102	1	0	0	7	8	37	0	3	174	214
Panhandle (Dist. 10)	13	8	4	1	44,739	660	399	0	0	0	1	1	1	0	0	6	7
Eastern (Dist. 5, 6, and 6-P)	10	3	0	7	37,668	437	354	1	0	0	6	7	8	2	3	98	111
Gulf Coast (Dist. 2 & 3)	30	21	0	9	184,647	1,340	1,239	1	0	0	4	5	58	26	36	265	385
Southwest (Dist. 1 & 4)	16	10	1	5	90,997	1,308	1,215	0	1	1	4	6	45	7	29	380	461
Louisiana	67	49	5	13	331,871	1,501	1,496	1	0	0	5	6	39	13	4	140	196
Northern	45	31	5	9	137,712	866	992	0	0	0	2	2	3	2	0	63	68
Southern	22	18	0	4	194,159	635	504	1	0	0	3	4	36	11	4	77	128
Arkansas	6	1	0	5	28,463	210	187	0	0	0	3	3	3	0	0	45	48
Mississippi	6	4	0	2	43,617	234	271	0	1	0	2	3	4	1	1	70	76
Southeastern States	2	1	0	1	4,647	36	38	0	0	0	1	1	1	0	0	30	31
Montana	3	0	0	3	5,981	163	183	0	0	0	1	1	3	0	2	23	28
Wyoming	13	5	0	8	70,484	408	354	0	0	0	5	5	18	0	0	77	95
Colorado-Utah	5	2	0	3	28,327	94	160	0	0	0	2	2	2	0	0	38	40
New Mexico	5	4	0	1	22,949	339	405	1	0	0	0	1	10	0	2	33	45
California	50	33	2	15	213,318	1,749	1,918	0	0	0	12	12	27	0	6	310	343
Total United States	750	402	53	295	2,715,781	25,061	24,862	15	2	4	128	149	641	60	131	3,723	4,555
Total previous week	717	395	54	268	2,632,687	24,311	24,047	17	1	4	115	137	626	58	127	3,595	4,406
Total September 4, 1948	815	454	58	303	2,915,785			22	0	1	100	123	595	53	177	3,280	4,105

Service wells included: *5, †8, 11, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 3 crude oil	B. of M. Sept. demand	Aug. 27 crude oil
Alabama	1,150	1,350	1,200
Arkansas	72,450	88,000	73,150
California	899,700	920,000	899,300
Colorado	66,100	70,000	67,600
Eastern	60,300	60,800	60,000
Florida	1,275	1,400	1,600
Illinois	181,500	180,000	184,100
Indiana	28,500	28,000	26,600
Kansas	238,950	302,000	256,300
Kentucky	22,800	22,000	22,900
Louisiana	483,600	528,000	482,700
North Louisiana	113,150		113,400
South Louisiana	370,450		369,300
Michigan	40,700	46,000	46,900
Mississippi	100,550	110,000	100,850
Montana	27,200	25,000	27,100
Nebraska	600	700	500
New Mexico	124,700	134,000	125,075
Oklahoma	379,000	410,000	378,300
Texas	1,898,575	2,130,000	1,838,200
Dist. 1 (Southwest)	26,350		25,740
Dist. 2 (Southwest)	116,600		112,000
Dist. 4 (Southwest)	182,625		177,600
Dist. 3 (Gulf Coast)	353,500		338,860
Dist. 5 (Eastern)	33,125		32,100
Dist. 6 (Eastern)	80,825		79,000
East Texas field	231,825		222,400
Dist. 7-C (West)	45,725		42,300
Dist. 8 (West)	536,750		519,100
Dist. 7-B (W. Central)	59,200		57,600
Dist. 9 (N. Central)	138,575		137,300
Dist. 10 (Panhandle)	93,475		94,200
Utah	1,600	900	1,300
Wyoming	126,400	122,000	126,800
Total United States	*4,755,650	5,180,000	4,720,475
Change from previous week, up	35,175		
Canada	64,880		65,280

Total U. S. production January 1-September 3 †1,248,801,635 bbl.
Same period last year (crude plus cond.) 1,354,355,805 bbl.

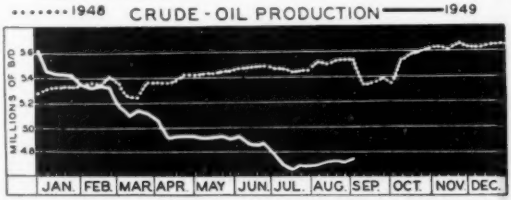
*Not incl. 82,085 bbl. condensate. †Incl. 20,309,985 bbl. condensate.

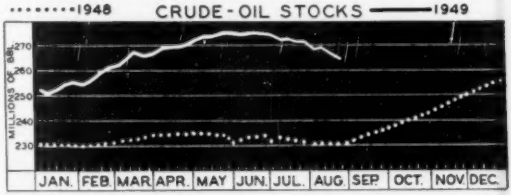
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

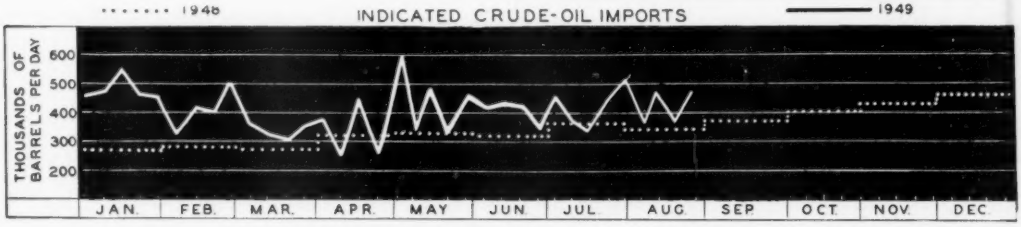
(Thousands of barrels)

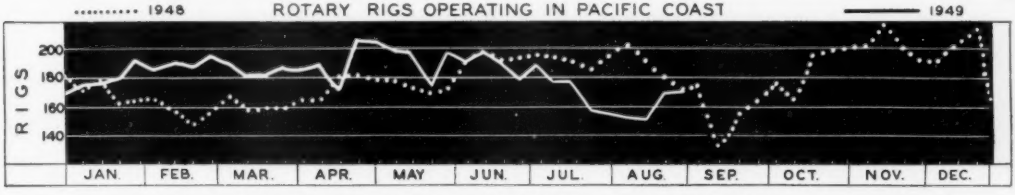
	Aug. 27, 1949	Aug. 20, 1949	Aug. 28, 1948
Pennsylvania Grade	3,465	3,409	2,804
Other Appalachian	1,854	2,025	1,231
Ill., Ind., Mich.	13,294	13,514	11,073
Arkansas	2,851	2,977	2,832
Louisiana	15,010	14,829	11,895
North	3,733	3,683	3,099
Gulf	11,277	11,146	8,796
Mississippi	2,727	2,794	2,795
New Mexico	7,739	7,782	6,279
Oklahoma and Kansas	39,242	39,282	33,817
Texas	121,612	123,372	111,821
East Texas	16,912	16,345	16,159
West Texas	48,779	49,491	42,391
Texas Gulf	28,757	30,025	28,444
Other Texas	27,164	27,511	24,827
Rocky Mountain	13,993	14,143	9,497
California	35,327	35,290	30,426
Foreign	7,344	7,038	5,403
Total United States	264,458	266,455	229,873

*Bureau of Mines.









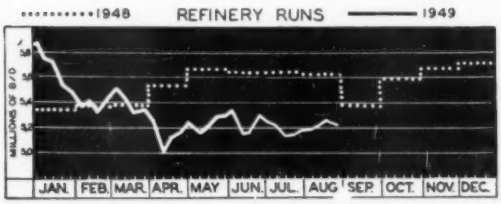
Refining Statistics

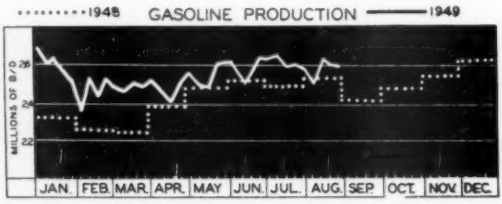
A.P.I. REFINERY REPORT, AUGUST 27

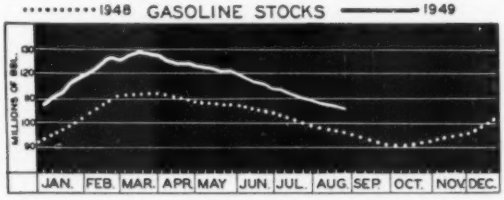
(Thousands of barrels)

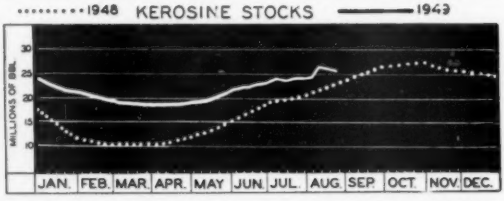
District	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, August 1948: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	776	337.9	27.3	174.4	180.4	23,911	10,805	22,226	9,860	868	326.6	41.4	177.9	215.0
Appalachian:														
District 1	87	39.4	2.6	10.0	8.9	2,357	426	674	486	95	42.2	3.7	10.9	9.8
District 2	59	32.6	4.3	4.4	10.4	1,124	146	238	176	28	12.5	1.2	4.7	9.5
Ind., Ill., Ky.	904	494.0	50.3	112.0	125.6	23,135	5,303	12,419	4,483	914	477.9	49.7	139.2	155.2
Okla., Kans., Mo.	428	245.1	16.9	84.1	65.7	9,345	1,677	6,065	2,094	486	245.6	19.3	95.3	76.5
Inland Texas	187	151.8	7.0	23.2	44.3	3,686	673	1,074	1,443	245	148.2	11.3	26.3	62.1
Texas Gulf Coast	1,221	596.9	68.4	219.9	231.1	15,304	2,854	11,884	7,543	1,412	608.4	96.3	306.5	262.3
La. Gulf Coast	428	209.1	36.3	123.7	59.3	5,705	2,313	4,143	2,088	434	189.5	45.3	100.6	78.8
N. La. and Ark.	82	33.1	4.8	13.6	18.0	2,734	477	939	325	80	30.2	7.5	13.2	17.9
Rocky Mountain:														
New Mexico	10	6.3		1.9	2.9	93	25	98	30	14	7.1	0.5	2.0	4.0
Other Rocky Mtn.	181	82.6	3.7	33.7	35.3	2,352	386	1,858	676	158	70.7	3.8	27.9	34.1
California	852	368.3	4.8	126.4	303.4	16,534	719	13,100	39,190	887	373.3	16.1	133.9	322.3
August 27, 1949	5,215	2,597.1	226.4	927.3	1,085.3	106,280	25,804	74,718	68,394	5,621	2,532.2	296.1	1,038.4	1,247.5
August 20, 1949	5,241	2,599.3	233.4	863.1	1,070.9	107,612	25,822	75,312	68,157					
August 28, 1948	5,739	2,531.7	309.3	1,060.3	1,313.7	95,504	23,166	61,814	53,544					

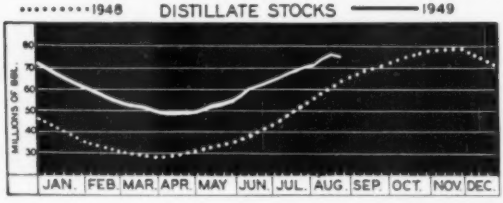
*At refineries including natural blended. †Finished and unfinished.

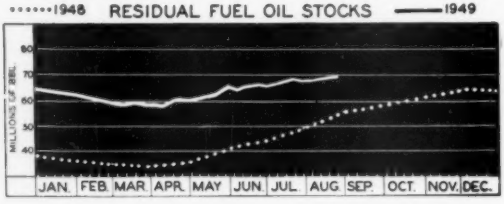


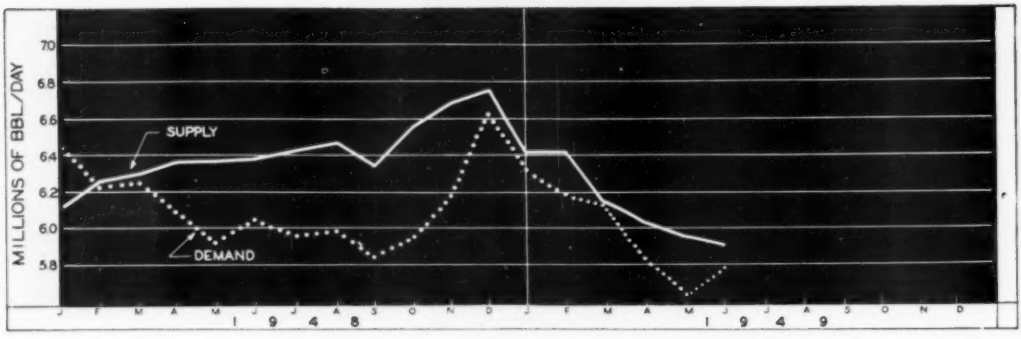












CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.40
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

INCREASED movements of home-heating fuels in the last half of August are reflected in the first decrease in distillate stocks. For the week ended August 27, distillate inventories dropped almost 600,000 bbl. Production was up about 450,000 bbl. for the week but was still 931,000 bbl. below the same week last year. However, the relatively high production last year resulted in a stock gain of 2,728,000 bbl. For the first time this summer, indicated refinery demand for distillate was above the same week in 1948.

Summer fillup discounts on the East Coast were terminated at the end of August. The general opinion in the area is that the plan was not very successful since fillup sales continued to lag until about 2 weeks ago.

The Gulf Coast distillate market continued firm. Material for immediate delivery is available at about 7 cents, but some suppliers were asking as much as 7.5 cents for late September liftings. On the other hand, gasoline offerings were above normal with sellers hoping to reduce stocks before the end of the season.

The big increase in the number of cars in use is expected to keep gasoline demand above last year, but there will be a decline from the vacation level. Unless refinery yields are lowered, gasoline inventories will start building up earlier this year.

On the West Coast, the rapid increase in residual stocks and the soft heavy-fuel market have resulted in a reduction of 35 cents per barrel in residual prices and slight reductions in prices paid for heavy crudes. The new residual price of $1.25 per barrel is still well above the net-back on shipments to the East Coast.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 5, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 73-75 octane	9⅝-10	11.5	9½-10
Premium gasoline, 78-80 octane	10⅜-11	12.5	10½-11
42-44 w.w. kerosine	7¾-8¼	7.9-8.4	7⅞-8¼
No. 2 straw fuel oil	6⅜-6¾	7.3-8	6⅞-7
No. 6 residual	$0.85-0.90	$1.70	$1.35-$1.45

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6	6.3

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	13
2,000 No. 5-6 neutral	14-15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	15
200 vis., No. 3 neutral, 0-10 pp.	12-14

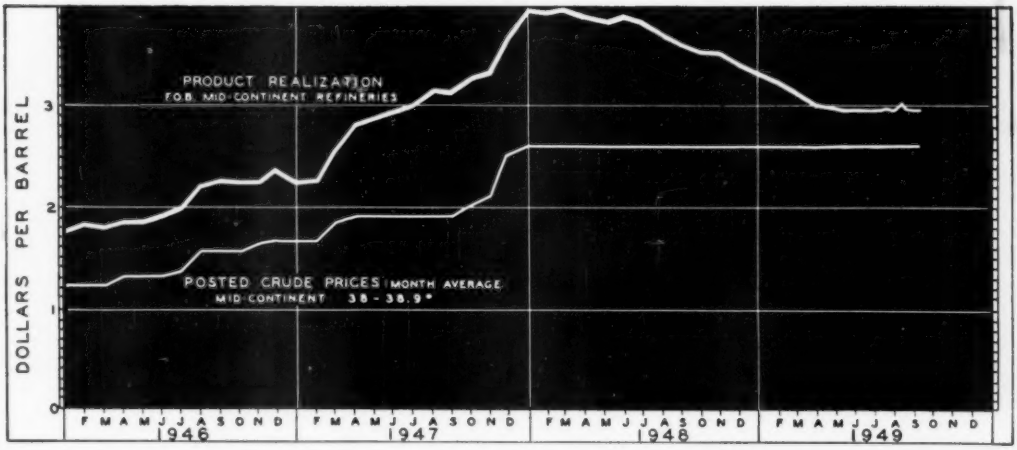
Western Pennsylvania

144-155 vis., 10 p.t. bright stock	19.5
180 vis., 0 p.t. neutral	20.5

CRUDE-SCALE WAX

Mid-Continent

132-134 A.M.P.	4.5



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

Quality Controlled

FROM INGOT TO FINISHED PRODUCT

WORTH

Expanded

FUSION WELDED STEEL PIPE

Because Worth Welded Steel Pipe is *expanded* . . . uniform in gauge and quality . . . free from surface defects . . . accurate and uniform in dimensions (allowing for ease in fitting-up and welding) . . . and because, our steel is carefully controlled from ingot to finished product, more and more users of large diameter pipe are relying on it to transmit gas from field to plant and terminal. Worth *Expanded* and Welded Steel Pipe may be obtained in 20", 24", 26", 30", and 36" O.D. diameters—write for detailed information.

Worth also produces Carbon and Stainless Clad Steel Plates, Flanged and Dished Heads

WORTH STEEL COMPANY · Claymont, Delaware

EQUIPMENT MEN . . . in the News

Thralls Is Vice President Of Seismograph Service

After the August meeting of the board of directors of Seismograph Service Corp., it was announced by G. H. Westby, chairman, that T. A. Manhart and George W. Reed had resigned as directors of the corporation. Both had previously resigned as officers and employes of the corporation and its subsidiaries but had continued as directors.

Simultaneously, the election of Hugh M. Thralls, of Tulsa, to the position of vice president was announced. At the time of his election, Thralls was already serving as a director and as chief geophysicist of the company. Graduated in 1934 by University of Oklahoma with an M.S. degree in physics, Thralls joined S.S.C. in 1936 as party chief of a crew located at that time in Illinois.

The next 3 years found him gaining experience in seismic exploration in Illinois, Oklahoma, Michigan, Texas, and California. Early in 1939 he advanced to the position of supervisor, with headquarters in Illinois, and in 1943 he was brought to the Tulsa office. He was made chief geophysicist in 1945 and the following year was elected a director of that organization.

L. G. Cornish, formerly of Tulsa, and S.S.C. employe for 18 years, has recently been placed in charge of the company's Midland, Tex., office. Cornish, who has had experience in geophysical exploration throughout the Mid-Continent area and in Romania, returned to S.S.C. after 2 years with American Exploration Co., Lafayette, La., which until recently was a subsidiary company of S.S.C.

Eastman Names Agents In Kansas and Panhandle

Dufek Oil Well Service Co., of Hutchinson, Kans., has been named exclusive agent for Eastman Oil Well Survey Co., in Kansas, Oklahoma Panhandle, and the northern section of the Texas Panhandle areas.

This recent agreement between Eastman and Emil Dufek, president of the Dufek company, applies to instrument rentals and equipment; however, directional drilling and oil-well surveying work by Eastman can also be obtained through any of the Dufek representatives.

California Meter Group To Hear P. O. Engelder

Southern California Meter Association will hold its September meeting at the Rio Hondo Country Club near Downey, Calif., on Thursday, September 15.

Principal speaker will be P. O. Engelder, Oil Well Water Locating Co., who will discuss "Recording of Water Content in Hydrocarbon and Water Emulsions." Specific points to be made in Engelder's talk will include principles of instrument operation, field results obtained, and pointers on maintenance.

Harrell Named Supervisor For Southern Geophysical

J. G. HARRELL

J. G. Harrell of Fort Worth has been appointed a supervisor of Southern Geophysical Co. with headquarters in the Sinclair Building, Fort Worth, Dr. Sidon Harris, president of the company, announced.

Harrell has been engaged in civil engineering and during the past 17 years has done seismograph work for Seismograph Service Corp., Mid-Continent Petroleum Corp., and Stanolind Oil & Gas Co. He will assist in the supervising of Southern's 10 seismograph field parties in the Southwest.

Specht Made Manager of Heat Transfer Division

R. A. SPECHT

Robert A. Specht has been appointed manager of a new heat-transfer division which National Radiator Co. has created to handle the design and sales of heat-transfer products for the chemical, petroleum, gas, and steel industries.

In making this announcement Carroll M. Baumgardner, vice president for sales, reported that Specht had set up divisional sales headquarters in New York City.

A graduate of Rensselaer Polytechnic Institute, Specht has been with National Radiator for several years as an Eastern sales representative in the company's industrial division. Prior to this work he was associated with Struthers Wells Corp., Warren, Pa., as a heat transfer specialist.

Rocco to Distribute Macco Muds in Rocky Mountains

Stan McPherrin and Al Seaman, former employes in the drilling-fluid division of Macco Corp., Los Angeles, have organized a new company to be known as Rocco, which will be located at Casper, Wyo.

Both men are well qualified drilling mud engineers and are especially conversant with oil emulsion types of drilling fluids. They will be assisted by Jack Stone, who will be the chief mud engineer for Macco Corp. in the mountain area.

(Continued on page 153)

Kenworth Distributor Occupies New Quarters

J. T. Jenkins Co., distributor in California, Nevada, Arizona, and New Mexico for Kenworth trucks, is established in this new Los Angeles headquarters building. The brick building provides 35,000 sq. ft. of floor space

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Mayhew Shot Hole Drilling Rig mounted on 1947 Ford truck. 550 gallon water tank mounted on 1947 Ford truck. Complete with all equipment, in good condition, ready to move on job. Bargain. F. W. Brown, Box 607 or Phone 400, Britton, Oklahoma.

CARDWELL RL SPUDDER. Completely equipped. Good operating condition. Located Central Oklahoma. For prices and terms write: Barnes Drilling Company, 22 West Fourth St., Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

FOR SALE: Failing Model 1500 Heavy Duty Rotary drilling rig, equipped with 4½" x 6" mud pump, mounted on 1948 International KB6 truck, complete with drill pipe, subs, tools, etc. Also 800 gallon custom built water tank, equipped with vacuum lift, mounted on 1948 International KB6 truck. All equipment in excellent condition. Address: Box D-168, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Failing "1500" portable rig for shot-hole, core, water-well, and shallow production drilling. Equipped with sand reel and bailer. Mounted on GMC truck. Rig and Truck in excellent condition. Rider & Montgomery, Box 523, Douglas, Wyoming.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

FOR SALE

10—55,000 barrel steel storage tanks, riveted. Will quote "as is where is" or dismantled and re-erected.

ROGERS AND WRIGHT, INC.
710 Peoples Building
Charleston, West Virginia
(Phone 30-171)

EQUIPMENT FOR SALE

USED Franks Well Servicing Unit, super East Texas model, 7 x 8 x 62-foot pole mast, good condition. Box D-165, The Oil and Gas Journal, Tulsa, Oklahoma.

ROTARY Rig complete, 87 foot telescope mast, Wilson mogul drawworks with 145 h.p. GAK Waukesha motor, 2 5x8 Oil Well mud pumps with 285 h.p. Waukesha motors, doghouse, light plant, approximately 4,000 feet 4½ inch drill pipe. 1 1949 KB-8 International truck with 28 foot Hobbs float, 1 1948 2 ton Chevrolet truck with 22 foot float. Rig now drilling 6 miles west of Davis, Oklahoma. 2 drilling contracts 2100 ft. and 3300 ft. goes with rig if desired. Price $45,000.00; terms if desired, $20,000.00 down, $2,000 per month, thereafter. Sanders Oil Company, Call 710 Shawnee, Oklahoma, or 18F2 Pearson, Oklahoma.

FOR SALE: 1945 Sullivan #200 mounted on White truck. Contact James H. Green & Co., day phone 9884, P. O. Box 1465, San Angelo, Texas.

FOR SALE: New Beaird Packaged Compressor Plant with Ingersoll-Rand Type 6XVG 225 HP two stage gas compressor equipped with hand operated fixed volume pockets. Intake pressure range 100-200 PSI. Discharge pressure 1000 PSI. Capacity range 1,450 to 2,050 MCF. Ready to operate. Location Bishop, Texas, Box D-161, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: No. 14 Armstrong, truck mounted, FORD Motors, V-Belt Drive, with 6" tools and bailer. PRICE $2,000.00 cash. No. 25 Armstrong, trailer mounted, hard rubber, for deep drilling, jack shafts, for V-Belt drive, no motor, nor tools. Price $1,000.00 cash. Both machines have Bucyrus rubber tops for spudding. Write or phone Gray Well Drilling Co., Delafield, Wis.

FOUR Lufkin single crank #31 C pumping units, complete with 30 H.P. General Electric motors. Full particulars, Wiegand Bros., Milam Bldg., San Antonio, Texas.

FOR SALE: Cardwell Rotary Rig, complete with Mast. Suitable for 3,500 ft. drilling. Bargain. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: CARDWELL Model R double drum draw works manufactured 1946, in good condition, price $9,000.00. Box D-155, The Oil and Gas Journal, Tulsa, Oklahoma.

FACTORY OVERHAULED—DRILLING OR PIPE LINE ENGINE

Model RX1SV Le Roi 12-cylinder, 6¾" Bore x 7" Stroke, 3006 cu. in. displacement. Complete with Radiator, Starting Engine, Clutch and all latest accessories. Full-size crankshaft. Operated approximately 1,000 hours since complete overhaul and modernizing at factory service shop. Price $4,000.00.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLA. Phone: LD294

FOR SALE
OFFSHORE SEISMOGRAPH FLEET

Bids are invited for the following equipment which includes all boats, Shoran surveying equipment, and radio equipment required for offshore seismic exploration. At present based at Freeport, Texas, and can be inspected by appointment.

BOATS

2—62'-4" Diesel twin screw steel recording boats built to order by Higgins
2—45'-9½" Diesel twin screw "Eureka" boats for Shoran base stations
1—37' gasoline single screw wooden "Eureka" boat
1—45' steel utility barge
1—16' Higgins skiff with outboard motor.

SHORAN EQUIPMENT

Complete Shoran surveying equipment for three mobile stations and three base stations.

RADIO EQUIPMENT

7—Kaar series 46Y radio transmitters (50 watt).
7—Kaar series 25EY radio receivers.
6—Premax antennas.
4—Kaar 642A power supply (110 v AC)
5—Kaar D24Y direction finder receivers.
1—Set Halliburton wire line surveying equipment.
Miscellaneous radio and Shoran test equipment.

ALSO

1—110' converted Sub-chaser Diesel twin screw wooden recording boat complete with necessary radio equipment at present based at Morgan City, Louisiana.

Write Box D-143, THE OIL AND GAS JOURNAL, Tulsa, Okla.

COMBINED VAPOR SEPARATOR & FRACTIONATOR FOR THERMAL REFORMING

One (1) New 5'-6" ID x 61'-0" over-all height Bubble Tower made of 1¼" Plate and lined throughout with 5/64" and 7/64" thick, 11-13% Chrome stainless steel, type 405. Stainless steel support plates in place for 15 Trays. (Trays not included). Constructed in accordance with the API-ASME Code, stress relieved and radiographed. Designed for 400 PSI @ 750° F. Fabricated by A. O. Smith Corporation. Platform and ladder clips installed.

WOOD RIVER OIL & REFINING CO., INC.
335 West Lewis Street, Wichita, Kansas
Telephone 7-3325

WE CARRY THE LARGEST STOCK OF

New Parts for Civilian & Army Trucks

Winches, Steel Snatch Blocks, Pulleys, Heavy Duty Tools, and Equipment

Phone! Wire! or Write!

RING BROS.
Route 1 Elizabeth, N. J.
Phone: ELizabeth 3-7800

EQUIPMENT FOR SALE

PIPE LINE PUMPS. Two 3-stage Byron Jackson Centrifugal pumps, direct connected to 400 H.P., 1730 RPM three-phase 60-cycle Westinghouse Motors, unitized on steel base and complete with electric controls. Each pump can deliver between 25,000 and 27,000 barrels crude per day at 350 pounds, or in series between 40,000 and 43,000 barrels at 750 pounds. These units are in good condition. Included are a number of spare parts. Call or write C. G. McLaren, Shell Oil Co., Tulsa, Oklahoma.

CORE Drilling & Shot Hole Rigs; Longyear, Sullivan, Franks, Chicago Pneumatic. Good used equipment, ready for service. PK rods, N rods, B rods, bits, Spudders and cable tools. Everything for well drilling. We save you money. Pressey & Son, Pueblo, Colo.

FOR SALE: Ideco beam type drilling machine, A-1 condition. Rilse drilling motor. Two strings tools. 4500' new 7/8" drilling line. 4500' new 1/2" sand line. Light plant. 26-Star drilling machine. A-1 condition. Priced to sell. Phillips and Brick, Gradenhutten, Ohio. Phone 635-R-4.

FOR SALE

Eastern Kansas

25,000' 6⅝" OD 13# 11½ thd Casing	.50 ft.
25,000' ⅞" Sucker Rods	.05 ft.
50 2 D Jensen Pumping Jacks w 1 H.P. weather proof electric motors	260.00 ea.

Box D-187

The Oil and Gas Journal
Tulsa, Oklahoma

NEW
FRACTIONATING TOWER
REFLUX DRUM

One (1) New fractionating" tower, 5'-0" I.D. X 89'-6" over-all height X 1⅛" plate. Thirty-four (34) bubble trays, ten (10) 18"-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

One (1) new horizontal reflux drum, 5'-6" I.D. x 18'-6" over-all length x 1⅛" plate. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

ROCK ISLAND OIL & REFINING CO., INC.
335 West Lewis St. Wichita, Kansas
Phone 7-3325

REFINERY AND GASOLINE PLANT EQUIPMENT

(1) Vacuum tower, 5 ft. x 44 ft. 7 in. x ⅜ in., with 11 trays and pipe coil in bottom. $2500.
(1) Gasoline weathering tower, 3 ft. 6 in. x 50 ft. x ½ in., with four trays on 16 in. spacing; 200 lb. test with 2 ft. 4 in. x 10 ft. condenser on top. $1100.
(1) Pressure vessel—9 ft. 2⅞ in. x 41 ft. 3¼ in. x 1 7/16 in. thick, double riveted construction. $5000.
(1) Still, 6 ft. x 35 ft. x 1 in., dished heads, 200 lb. W.P. with 200 sq. ft. 2 in. pipe coil. $2500.
(6) 18,000 gallon casinghead gasoline storage tanks, 10 ft. x 30 ft. x ½ in., dished heads. $900 ea.
(5) 8,000 gallon casinghead gasoline storage tanks, 7 ft. x 30 ft. x 7/16 in., dished heads. $600 ea.
(5) Vessels, 3 ft. 6 in. x 10 ft. x ⅜ in., dished heads. $190 ea.
(1) Truscon Steel Building, 60 ft. x 186 ft., heavy fabricated structural steel and steel panel construction. With steel sash and door. $5580.

Above listings subject to prior sale.

Write—Wire—Phone

BROWN-STRAUSS Corporation
P. O. Box 78 Phone LD 169
Kansas City, Missouri

EQUIPMENT FOR SALE

FOR SALE: 68 Class 2 Tank Cars 8000 Gal. Good Running Order. Delivery East and Middle West. $675 Each. R. C. Stanhope, 60 E. 42nd St., New York, N. Y.

FOR SALE: One FXO-172 7¼ x 10 Gardner Denver pump with skids, 48" pulley and suction hose, in good condition, $2750.00. One 13000 Cat Diesel Motor, run 935 hours, overhauled, $2300.00. One Gumbo Buster Swivel, good condition, $300.00. One Oil Well 60 traveling block with hook, good condition, $400.00. One Wilson Mogul draw works, overhauled, $1750.00. This equipment may be inspected at Bury Manufacturing Corp., Highway 64 East, Princeton, Indiana.

EQUIPMENT FOR SALE

6000-FT. ROTARY RIG, diesel powered, complete with 4½" drill pipe, ready to drill. Near Alice, Texas. Full particulars and price, Wiegand Bros., Milam Bldg., San Antonio, Texas.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

TUBOSCOPED
EXCELLENT USED 4½" DRILL PIPE

We have just had this 6.100' string *Sonoscoped* (new Tuboscope method) resulting in 142 Jts. No. 2 and 59 Jts. No. 3. API Full Hole Tool Joints caliper approximately 5⅝" to 5¾" O.D. and none are defective. Price $2.00 per foot.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLA. Phone LD204

O E M INDUSTRIES
Manufacturers

INDUSTRIAL GEARS & SPROCKETS, MACHINE PARTS OR COMPLETE ASSEMBLIES.
WE **Know How** TO PUT **Your Ideas** INTO PRODUCTION
PHONE M-4931
301 N. JUSTIN ST., DALLAS 11, TEXAS

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

ALMOST NEW—DRILLING OR PIPE LINE ENGINE

Model RX1SV Le Roi 12-cylinder, 6¾" Bore x 7" Stroke, 3006 cu. in. displacement. Complete with Radiator, Starting Engine, Clutch and all latest accessories. Operated approximately 1,000 hours. Price $6,500.00.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLA. Phone: LD204

NOW IN PROGRESS
OUR LATEST LIQUIDATION

100 OCTANE GASOLINE REFINERY
LOCATED AT COTTON VALLEY, LA.

EQUIPMENT IN UNUSUALLY FINE CONDITION

ADDRESS INQUIRIES TO:
P. O. BOX 1787
SHREVEPORT, LA.
TELEPHONE: COTTON VALLEY 26

DULIEN STEEL PRODUCTS, INC.
of Washington
9265 E. MARGINAL WAY
LANDER 6000
SEATTLE 8, WASH.

EQUIPMENT FOR SALE

FOR SALE: Wilson-Snyder 12PLD pump, mud boat mounted, 48" 9 belt C section sheave, bargain, P. O. Box 324, Dallas, Texas.

FOR SALE: McKissick Tubing and Floor Blocks. Save 50%. Melton Supply Co., Seminole, Okla.

ONE 40 H.P. O.C.S. Pumping Unit, 25,000 pound polish rod load. Eli Wilkonson, Box 1581, Phone 5-3545, Tulsa, Oklahoma.

FOR SALE: Radial drill press used six months. One Jackson engineering reboiler, size 16-35-75, tube pressure 175 lbs., temperature 380° F. Model #1, heater #265. Excellent condition. Box 610, Mt. Pleasant, Texas.

FOR SALE: Two like new 74,000 bbl. cap. tanks. Low price, at Morgantown, W. Va. 2 new 10,000 bbl. bolted at N.Y. Darien Corp., 60 E. 42nd St., N. Y., N. Y.

404 CORE BARREL—Drills faster, takes larger core, runs in 6¼ inch casing. Makes 2⅞ inch core. Prices quoted on request. Mf'g by East Side Machine Works, 17 S. Ashby, Chanute, Kansas.

EQUIPMENT WANTED

WANTED—1,000 Victaulic Couplings for 4" O.D. Invasion pipe with 4½" O.D. Shoulder. Quote price, condition and location. Box D-184, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE, Valves and Propane tank wanted: 3" and 4" pipe car load lots, no objection to internal corrosion and pitting, also Propane tank, also unloading compressor, also high pressure valves and cocks up to 3". Aylmer Trading Co., Aylmer, Ontario.

WANTED: One 300 or 400 HP Gas Engine Compressor Unit. Box D-163, The Oil and Gas Journal, Tulsa, Okla.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

HELP WANTED

GRADUATE Civil Engineer, not over 35 years of age, preferably with pipeline experience, for work in engineering department of medium sized pipeline company located at Tulsa. Box D-186, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Experienced Seismologists and Seismic Computers by large, well established geophysical company. Give full details of education and experience in letter. All replies will be held confidential. Reply Box D-188, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Seismograph computors and party chiefs. Must be experienced and available immediately. Box D-175, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline, pipe lines, geological, exploration, supplies, manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 28th year).

FOR large company operating throughout Mid-Continent and Rocky Mountain states. Contract man with land experience and knowledge of operations. Excellent opportunity. Please state education and experience. Inquiries confidential. Box D-167, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION MAN
Must have broad thorough technical education, not less than five years of successful experience. Requirements stiff. Salary in keeping with ability. Box D-159, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE inspectors, arc welders, lay, ditch, paint, lowering-in. Only men with broad main line experience accepted. Job located midwest. Attractive wages if accepted. 715 Midland Bldg., Kansas City 6, Mo.

HELP WANTED

MECHANICAL ENGINEER
Thorough university background followed by five or more years of outstanding achievement a definite requirement. Must have creative ability, a precision-technical mind. Men of less ability should not make inquiry. Salary commensurate with rigid requirements. A Missouri corporation. Correspondence confidential. Box D-160, The Oil & Gas Journal, Tulsa, Oklahoma.

HOUSTON DISTRICT Sales Engineer: Engineer familiar with pumps, compressors, exchangers, etc., having sold this type of equipment in Texas for at least the last 3 years to refinery, gasoline plant, and pipe-line companies. Replies confidential. Box D-117, The Oil and Gas Journal, Tulsa, Oklahoma.

PHOTOGEOLOGIST
A firm of consulting geologists has a position open for an experienced photogeologist with at least two years work in surface mapping. This is an excellent opportunity for a man with the right qualifications. Salary dependent on experience. Give full particulars of experience and references first reply. Box D-182, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

GEOLOGIST with current or recent active experience in West Texas wanted for geological department of independent oil company located in Midland, Texas. Excellent opportunity for man under forty years age who can organize, direct and administer all phases of an aggressive geological program leading to the development of production. Personal interview may be arranged based on merit indicated by a written outline of past experience and training. All replies will be handled in confidence, and should include date of availability and starting salary desired. Recent photo or snapshot would be helpful. Address Box D-139, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Gravity Party Chiefs for crews in United States and Canada. Reply Box D-189, The Oil and Gas Journal, Tulsa, Oklahoma.

SENIOR Auditor, independent oil company, southwest, has opportunity for experienced oil accountant with minimum of three years auditing experience. Age below 40. Reply Box D-176, The Oil and Gas Journal, Tulsa, Oklahoma, giving complete details as to education, experience, and salary desired.

Man with Knowledge of Materials

Excellent opportunity with old established Chicago firm for an engineer or materials man able to identify, name, describe in detail, and classify a wide variety of materials, supplies, equipment and spare parts, such as are used on a large construction project and in the operation of a good sized municipality.

Should have engineering degree or equivalent training, and have had wide experience in material specifications or material control. Salary open.

Willingness to undertake occasional assignments at any location at home or abroad highly desirable.

In first letter give, in confidence, age, details of education, and complete employment record with dates and rates of pay. Our staff knows of this advertisement.

Write Box D-177,
The Oil and Gas Journal, Tulsa, Oklahoma

REFINERY PERSONNEL

Aggressive, independent integrated oil company is expanding and modernizing its refining facilities and needs qualified supervisory personnel to fill the following positions:

★ **Refinery Manager**

★ **Distillation and Treating Supervisor** ★ **Cracking Supervisor**

★ **Shops Supervisor** ★ **Maintenance Supervisor**

★ **Plant Technologist** ★ **Instrument Supervisor**

Location: Southwest

Qualifications: At least Bachelor's Degree applicable to position, minimum of 5 years' refining experience applicable to position with at least 1 year in a responsible supervisory position, age 40 or under.

WRITE FULL DETAILS REGARDING YOUR AGE, EDUCATION, PAST AND PRESENT EMPLOYMENT, PRESENT SALARY AND SALARY DESIRED.

Box D-181, The Oil and Gas Journal, Tulsa, Oklahoma

SITUATIONS WANTED

PETROLEUM CHEMIST: Age 31, eight years experience special physical inspections and chemical analyses associated with petrochemical research, new product development, and refinery process service, including staff supervision. Familiar with refinery control tests. Engineering degree background. Box C-855, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEM. ENGR.—Recent graduate, B.S.—Tau Beta Pi and Sigma Tau—23 years old, married, hard worker, veteran—consider anything. Box D-179, The Oil and Gas Journal, Tulsa, Oklahoma.

PURCHASING, Assistant or Buyer. College Graduate, age 32. Six years' experience buying Refinery, Drilling, Production Equipment. Desires permanent connection offering possibilities for advancement. Box D-178, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

LADY with extensive oil and legal experience, secretarial and office management, desires work with independent oil company. P.O. Box 2273, Casper, Wyoming.

GEOLOGIST: Varied experience, surface and sub-surface geophysical correlations, etc., desires position with independent company. Box D-183, The Oil and Gas Journal, Tulsa, Oklahoma.

TOOL PUSHER
20 Years experience on both cable and rotary, go anywhere. Box D-185, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVE with hundreds of refinery and contractor contacts on national scale. Only highest type propositions considered but not necessarily major manufacturer. Have designed and sold refineries. Highest references. Box D-164, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL COMPTROLLER AND ACCOUNTANT: Twenty-nine years' (24 Supervisory) continuous service with three companies engaged in all phases of oil industry. Can furnish outstanding references. Age 48; married. Desire position with reputable company. Box D-191, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT oil operator desires connection as land man; close deals. Age 38. Experienced all phases oil industry. Available about 30 days; anywhere. Box D-131, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER-SUPERINTENDENT — M.S. in Ch.E., age 35, registered Texas engineer, thorough knowledge refining, nine years varied experience engineering and plant supervision, most recently manager small refinery, available at once due to plant shut down. Write WRS, Box 112, Winnsboro, Texas.

INDUSTRIAL TRAINER
Fifteen years industrial training with major oil companies — sales, manufacturing and production. AB and MS Degrees. For personnel director or training director. Box D-154, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer: B.S. Desires position with active company in Mid-Continent. Seven years experience in all phases production engineering including completions, work-overs, production problems and secondary recovery. Qualified for production job. Box D-173, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ABOUT 2500 acres royalties good to 1965 at $6.00. Edge Hartley & Moore counties, near Sunray. 2 gas wells 1½ miles to East. Contact A. H. Hesse, Agent, Dalhart, Texas.

ROYALTIES IN HOT AREAS!
Recent strikes have focused attention on Montana's deeper oil zones and major companies are moving fast, drilling and leasing. We buy direct in the field, sell direct to our customers. Write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

CASH MARKET for PRODUCING ROYALTIES
ROBERT L. KINKAID
World Bldg. Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

WANTED: Connection with Independent Driller who is financially able to make test offsetting 1600 foot gas and salt-water well in Central South Dakota which intermittingly produces a little oil. We will lease block for responsible driller. John F. Schoof, Gettysburg, South Dakota.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Ky.

WILL BUY gas or oil production, large or small. Prefer properties with some undeveloped acreage. Might consider drilling deals. Box D-172, The Oil and Gas Journal, Tulsa, Okla.

WILL BUY oil leases anywhere, large or small blocks if any likelihood of oil field or good geology, provided you co-operate in furnishing all necessary information. Write fully what you have. Box 2153, Denver, Colo.

HAVE 2,800-acre block with one small well. Ellenburger production at 3,400 ft. New Pumping Unit, Tanks, Tubing, and Rods. Located in Comanche and Erath Counties, Texas. Contact C. O. Taylor, 1110 10th St., Lubbock, Texas.

WILL exchange beautiful 8-room home on 1½ acres on Galveston Bay, La Porte, Texas, worth $30,000.00, for oil leases, royalties or oil lands of equal value. W. P. Thomson, 437 South Hill Street, Los Angeles, California.

300 ACRES

Lynn County, Kansas, near La Cygne. Shallow production leases. Inactive, 12 wells. Will farm out to responsible firm. Some equipment.

MABES REAL ESTATE CO.
702 Commerce Bldg. Kansas City, Mo.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma, Louisiana and Illinois

Inquiries Invited

B. D. BUCKLEY

60 Broadway Drive, Clayton (5), St. Louis, Missouri

NORTH DAKOTA MINERALS

Bought direct for you on purchase order. I am thoroughly familiar with this play. Wire, call or write

JOHN ALLEN
808 Clarence Parker Hotel
Minot, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged.)

LEASE AND DRILLING BLOCKS

OFFERING large and small blocks of saw timber in Southern states. Oil rights go with land. Box D-190, The Oil and Gas Journal, Tulsa, Oklahoma.

1916 ACRE oil lease S.W. Wyoming, on Anticline, 5 Mi. of & in line with Major Oil Co. Well now drilling. One-half or all for $2.50 an acre. R. O. Barnsley, 950 Lincoln Ave., Palo Alto, Calif.

OIL LEASES, Ohio, Berea 700' proven 23 wells 364 A. or part, inexpensive, 23 wells 20 Brls. natural. E. N. Rehler, Allegany, N. Y.

WANTED to buy settled production sand wells. Preferably Illinois, Indiana, Kentucky. Will consider 40 or 50 barrels a day in Oklahoma, Kansas, or Texas. Gardenhire Brothers, Inc., Box 351, Bartow, Florida.

WANTED

Distributor Wanted

By Leading Manufacturer of
CORROSION RESISTENT COATINGS

Need distributor sales representation in Texas-Louisiana. Warehouse facilities required with close working arrangement with applicator or own application unit. Much promotional work has been done in Southwest.

Write Box D-180

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

EQUIPMENT MEN

(Continued from page 149)

H. E. Wheeler Joins Moore Products Sales Department

H. E. Wheeler has joined the sales department of Moore Products Co., Philadelphia, as manager of its Los Angeles branch office which will be opened in October.

Wheeler has had a wide range of experience in instrument engineering. He was responsible for the application and development of process control equipment for the complete Gaseous Diffusion plant at Oak Ridge. Previously, he had been associated with a large refinery and with a leading refinery construction company.

American Chain & Cable Names Dubocq Export Mgr.

W. E. Dubocq has been appointed export manager and A. Salas, assistant export manager of American Chain & Cable Co., Inc., and associate companies, with headquarters in New York City. Both Dubocq and Salas have been in the export department of the company for many years.

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CALENDAR OF EVENTS

September

American Institute of Chemical Engineers, Mt. Royal Hotel, Montreal, September 6-9.

Pacific Coast Gas Association, fifty-sixth annual convention, Santa Barbara, Calif., September 7-9.

National Association of Corrosion Engineers, Short Course on Corrosion, University of Texas, Austin, September 12-16.

Instrument Society of America, annual meeting and exhibit, Municipal Auditorium, St. Louis, September 12-16.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Chemical Society, 116th national meeting, Atlantic City, N. J., September 18-23.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

National Butane-Propane Association, Jefferson Hotel, St. Louis, September 19-21.

Mid-Continent Oil and Gas Association, twenty-seventh annual convention, Louisiana-Arkansas division, Roosevelt Hotel, New Orleans, September 22-23.

American Institute of Mining and Metallurgical Engineers, regional meeting, Nell House, Columbus, Ohio, September 25-28.

National Association of Corrosion Engineers, West Texas Chapter, annual Permian basin corrosion tour, Midland, Tex., September 27-30.

American Society of Mechanical Engineers, fall meeting, Hotel Lawrence, Erie, Pa., September 27-30.

American Society of Mechanical Engineers, fall meeting, Erie, Pa., September 28-30.

Colorado School of Mines, seventy-fifth anniversary observance, Golden, Colo., September 29-October 1.

October

Independent Petroleum Association of America, Texas Hotel, Fort Worth, October 2-4.

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

National Association of Corrosion Engineers, South-Central Regional Division, annual meeting, Adolphus Hotel, Dallas, October 3-4.

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Plaza Hotel, San Antonio, October 5-7.

California Natural Gasoline Association, Ambassador Hotel, Los Angeles, October 7

American Society for Testing Materials, Pacific Area, national meeting, Hotel Fairmont, San Francisco, week of October 10.

American Association of Petroleum Geologists, regional meeting, Buena Vista Hotel, Biloxi, Miss., October 12-14.

Symposium on Instrumentation for the Process Industries, fourth annual session, School of Engineering, Texas A. & M. College, College Station, Tex., October 12-14.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

Oil Progress Week, October 16-22.

American Gas Association, annual convention, Chicago, October 17-20.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Elk's Club, Los Angeles, October 20-21.

American Institute of Chemical Engineers, South Texas Section, annual meeting, Hotel Galvez, Galveston, October 21.

National Conference on Industrial Hydraulics, fifth annual meeting, Sheraton Hotel, Chicago, October 26-27.

Independent Natural Gas Association of America, annual meeting, Baker Hotel, Dallas, October 31.

November

Society of Automotive Engineers, diesel, Chase Hotel, St. Louis, November 1-2.

Pacific Chemical Exposition, Civil Auditorium, San Francisco, November 1-5.

Society of Automotive Engineers, fuels and lubricants, Chase Hotel, St. Louis, November 3-4.

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 7-10.

Petroleum Electric Power Association, annual conference, Hotel Beaumont, Beaumont, Tex., November 17-18.

Society of Exploration Geophysicists, regional exploration meeting, Adolphus Hotel, Dallas, November 17-18.

American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York, November 27-December 2.

December

American Institute of Chemical Engineers, annual meeting, William Penn Hotel, Pittsburgh, Pa., December 4-7.

NOMADS

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

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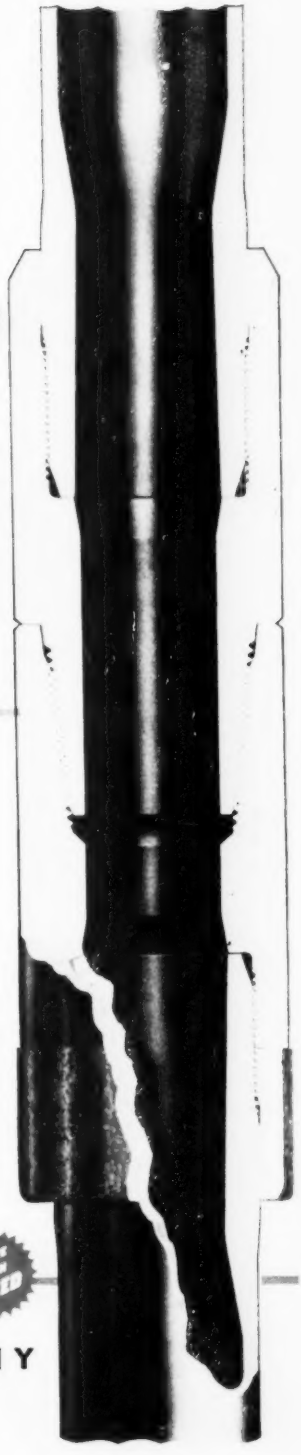
REED

Super Shrink-Grip

TOOL JOINTS

reduce drill string costs



This square landing shoulder eliminates the "human factor" in the field application of Reed Super Shrink-Grip Tool Joints. It eliminates the loose or split joints that result from inaccurate gaging.

Furthermore, it gives extra strength and rigidity and it forms a valuable third seal to protect against leakage.

But the square landing shoulder, another Reed "first", is only one of many features that make Reed Super Shrink-Grip Tool Joints the safest and most economical on the market. Ask your Reed representative to tell you about the others.

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Each basic industry still has a big job to do—and petroleum is in the forefront of the drive. Keep your drilling, pipe-laying and refinery operations rolling with the aid of *Preformed* Yellow Strand. It's the flexible rotary line that handles round trips faster. The smooth-running casing line that resists kinking. The winch or hoist line that spools evenly and curtails drum-crushing. To get going and *stay* going, specify long-lived *Preformed* Yellow Strand.

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Houston Branch: 1311 Palmer St.

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Charleston, West Virginia